Y 3.T 25:57/1984/errata

ERRATA SHEET
FOR
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
SEQUOYAH NUCLEAR PLANT
1984

1. Page 29, table 11, Milk, the K-40 mean reported as "164.43" should be "1340.90."

6/3/86

NOTE: This class, Y 3.T 25:57/, Annual Radiological Environmental Operting Report, Sequoyah Nuclear Plant (annual) (MF), has been added to item 1082-F-1.

Hold

Called Tenn. Valley Authority

Different title (similar)

RADIOLOGICAL HEALTH STAFF

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Annual Radiolog-
ical Environmental Operating Report
Sequoyah Nuclear Plant.(Annual)

Y 3.T25:57/
(date)

August 1985

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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
SEQUOYAH NUCLEAR PLANT
1984
TVA/NUC PR/RH

April 1985

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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

SEQUOYAH NUCLEAR PLANT

1984

Introduction

The Sequoyah Nuclear Plant (SQN), operated by the Tennessee Valley Authority, is located on a site owned by TVA containing 525 acres of land in Hamilton County, Tennessee, bounded on the east by Chickamauga Reservoir (see figure 1). The site is 12 miles (19.3 kilometers) northeast of Chattanooga, Tennessee, and 11 miles (17.7 kilometers) west-northwest of Cleveland, Tennessee. The plant consists of two pressurized water reactors; each unit is rated at 3,423 MWt and 1,171 MWe. Fuel was loaded in unit 1 on March 1, 1980, and the unit achieved criticality on July 5, 1980. Fuel was loaded in unit 2 in July 1981 and the unit achieved initial criticality on November 5, 1981. This report describes the environmental radiological monitoring conducted in 1984.

The preoperational environmental radiological monitoring program established a baseline of data on the distribution of natural and manmade radioactivity in the environment near the plant site. However, seasonal, yearly, and random variations in the data were observed. In order to determine the potential increases in environmental radioactivity levels caused by the plant, comparisons were made between data for indicator stations (those near the plant) and control stations (those remote from the plant) in conjunction with comparisons with preoperational data.

Radiological Health (Office of Nuclear Power) and the Office of Natural Resources and Economic Development carried out the sampling program outlined in tables 1 and 24. Sampling locations are shown in figures 2, 3, 4, 5, and 10. Table 2 describes the locations of the atmospheric and terrestrial monitoring stations. All the radiochemical and instrumental analyses were conducted in TVA's Western Area Radiological Laboratory (WARL) located at Muscle Shoals, Alabama. Alpha and beta analyses were performed on Beckman Low Beta II, Beckman Wide Beta II, and Tennelec LB 5100 low background proportional counters. Nuclear Data (ND) Model 6700 system, in conjunction with germanium detection systems were used to analyze the samples for specific gamma-emitting radionuclides. Specific analysis for iodine-131 in charcoal filters is performed using NaI(Tl) well detection systems attached to single channel analyzers. TVA-fabricated beta-gamma coincidence counting systems are utilized for the determination of ^{131}I concentrations in milk. Tritium determinations are made with Packard Tri-Carb 3255 or 4000 series liquid scintillation counting systems.

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Data were entered in computer storage for processing specific to the analysis conducted. The data obtained by germanium detectors were resolved by the appropriate analyzer software and the software program HYPERMET.

The detection capabilities for environmental sample analysis given as the nominal lower limits of detection (LLD) are listed in table 3. All photopeaks found in germanium spectra were identified and quantified. Many of the isotopes identified by germanium spectral analysis are naturally occurring or naturally produced radioisotopes, such as ^{7}Be, ^{40}K, ^{212}Bi, ^{214}Bi, ^{212}Pb, ^{214}Pb, ^{226}Ra, etc. LLDs for additional radionuclides identified by germanium analysis were calculated for each analysis and nominal values are listed in the appropriate data tables. In the instance where an LLD has not been established, an LLD value of zero was assumed. A notation in a table of "__ values <LLD" for an isotope with no established LLD does not imply a value less than 0; rather it indicates that the isotope was not identified in that specific group of samples. For each sample type, only the radionuclides for which values greater than the LLD were reported are listed in the data tables.

TVA's WARL participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by EPA-Las Vegas. This program provides periodic cross-checks on samples of the type and radionuclide composition normally analyzed in an environmental radiological monitoring program. Routine sample handling and analysis procedures were employed in the evaluation of these samples. The results received during calendar year 1984 are shown in table 4. The $\pm 3\sigma$ limits based on one measurement were divided by the square root of 3 to correct for triplicate determinations.

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Table 1

ENVIRONMENTAL RADIOACTIVITY SAMPLING SCHEDULE

Station Location	Air Filter	Charcoal Filter	Rain-water	Heavy Particle Fallout	Atmospheric Moisture	Soil	Vegetation	Milk	River Water	Well Water	Public Water	Aquatic Life and Sediment
Chattanooga	W	W	M	M		A					M	
Daycon	W	W	M	M	BW	A					M	
Sale Creek	W	W	M	M		A						
Daisy	W	W	M	M		A					M	
Northwoods	W	W	M	M		A						
Volunteer Ordinance Works (Harrison)	W	W	M	M		A						
Harrison Bay	W	W	M	M		A						
Georgetown	W	W	M	M		A						
Chester Frost Park (formerly Hamilton County Park)	W	W	M	M		A						
Work	W	W	M	M		A						
Site N	W	W	M	M	BW	A						
Site SW	W	W	M	M	BW	A						
Farm L							Q	W		M		
Farm J							Q	W				
Farm HW							Q	W				
Farm M							Q	W				
Farm Le							M	W				
Farm Su							M	W				
Farm Sm							M					
Farm EM							M					
Farm Br							M					
Farm C							M					
Chickamauga Reservoir									M			Q/S
E. I. Dupont											M	
Cleveland, TN											M	
C. F. Industries											M	
On Site Well (1)										M		
Farm Ma										M		
Farm S (Control)							M	W				
Farm B (Control)							M	W				
Farm C (Control)							M	W				

W - Weekly BW - Biweekly M - Monthly (every 4 weeks) Q - Quarterly S - Semiannually A - Annually

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Table 2

ATMOSPHERIC AND TERRESTRIAL MONITORING STATION LOCATIONS
SEQUOYAH NUCLEAR PLANT

Sample Station	Approximate Distance From Plant	Approximate Direction From Plant
LM-1 SQ, Southwest	0.75 Miles (1.2 kilometers)	SW
LM-2 SQ, Northeast	0.75 Miles (1.2 kilometers)	N
PM-1 SQ, Northwoods	10.5 Miles (16.9 kilometers)	WSW
PM-2 SQ, Chester Frost Park, TN (formerly Hamilton Co. Park)	3.75 Miles (6.0 kilometers)	W
PM-3 SQ, Daisy, TN	5.5 Miles (8.8 kilometers)	W
PM-4 SQ, Sale Creek, TN	10.5 Miles (16.9 kilometers)	N
PM-5 SQ, Georgetown, TN	9.5 Miles (15.3 kilometers)	ENE
PM-6 SQ, Work, TN	4.5 Miles (7.2 kilometers)	NNE
PM-7 SQ, Harrison Bay, TN	3.5 Miles (5.6 kilometers)	SE
PM-8 SQ, Harrison, TN	8.75 Miles (14.1 kilometers)	SSW
RM-1 SQ, Chattanooga, TN (Control)	16.75 Miles (27.0 kilometers)	SW
RM-2 SQ, Dayton, TN (Control)	17.75 Miles (28.6 kilometers)	NNE
Farm J	1.25 Miles (2.0 kilometers)	W
Farm HW	1.25 Miles (2.0 kilometers)	NW
Farm L	2.75 Miles (4.4 kilometers)	NNE
Farm M	3.5 Miles (5.6 kilometers)	NNE
Farm Ma	0.75 Miles (1.2 kilometers)	W
Farm Le	3.5 Miles (5.6 kilometers)	S
Farm SM	1.75 Miles (2.8 kilometers)	SE
Farm Su	3.25 Miles (5.2 kilometers)	SSE
Farm EM	2.5 Miles (4.0 kilometers)	N
Farm Br	2.25 Miles (3.6 kilometers)	SSW
Farm G	1.5 Miles (2.4 kilometers)	NNW
Farm B (Control)	43.0 Miles (69.2 kilometers)	NE
Farm C (Control)	16.0 Miles (25.7 kilometers)	NE
Farm S (Control)	12.0 Miles (19.3 kilometers)	NNE

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Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

A. Specific Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)*

	Air Particulates pCi/m^3	Charcoal pCi/m^3	Fallout mCi/Km^2	Water pCi/l	Vegegation and Grain pCi/g, Dry	Soil and Sediment pCi/g, Dry	Fish Clam Flesh, Plankton, pCi/g, Dry	Clam Shells pCi/g, Dry	Foods, Meat, Poultry, pCi/Kgm, Wet	Milk pCi/l
Gross α	0.005			2.0	0.05	0.35	0.1	0.7		
Gross β	0.01		0.05	2.3	0.20	0.70	0.1	0.7	25	
^{3}H				330						
^{131}I		0.01								0.05
^{89}Sr	0.005			10	0.25	1.5	0.5	5.0	40	10
^{90}Sr	0.001			2	0.05	0.3	0.1	1.0	8	2

*All LLD values for isotopic separations are calculated by the method developed by Pasternack and Harley as described in HASL-300. Factors such as sample size, decay time, chemical yield, and counting efficiency may vary for a given sample; these variations may change the LLD value for the given sample. The assumption is made that all samples are analyzed within one week of the collection date. Conversion factors: 1 pCi - 3.7×10^{-2} Bq; 1 mCi = $x.7 \times 10^{7}$ Bq.

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

B. Gamma Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)

	Air particulates pCi/m³		Water and milk pCi/l		Vegetation and grain pCi/g, dry		Soil and sediment pCi/g, dry		Fish pCi/g, dry		Clam flesh and plankton pCi/g, dry	Clam shells pCi/g, dry		Foods,(tomatoes potatoes, etc.) pCi/Kg, wet		Meat and poultry pCi/Kg, wet	
	NaI*	Ge(Li)**	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)
^{141,144}Ce	0.03		38		0.55		0.35		0.35			0.35		38		90	
^{144}Ce		0.02		33		0.22		0.06		0.06	0.35		0.06		33		40
^{51}Cr	0.07	0.03	60	44	1.10	0.47	0.60	0.10	0.60	0.10	0.56	0.60	0.10	60	44	200	90
^{131}I	0.01	0.01	15	8	0.35	0.09	0.20	0.02	0.20	0.02	0.07	0.20	0.02	15	8	50	20
^{103,106}Ru	0.04		40		0.65		0.45		0.45			0.45		40		150	
^{106}Ru		0.03		40		0.51		0.11		0.11	0.74		0.11		40		90
^{134}Cs	0.01	0.02	10	26	0.20	0.33	0.12	0.08	0.12	0.08	0.48	0.12	0.08	10	26	40	50
^{137}Cs	0.01	0.01	10	5	0.20	0.06	0.12	0.02	0.12	0.02	0.08	0.12	0.02	10	5	40	15
^{95}Zr-Nb	0.01		10		0.20		0.12		0.12			0.12		10		40	
^{95}Zr		0.01		10		0.11		0.03		0.03	0.15		0.03		10		20
^{95}Nb		0.01		5		0.05		0.01		0.01	0.07		0.01		5		15
^{58}Co	0.02	0.01	15	5	0.23	0.05	0.20	0.01	0.20	0.01	0.07	0.20	0.01	15	5	55	15
^{54}Mn	0.02	0.01	10	5	0.20	0.05	0.15	0.01	0.15	0.01	0.08	0.15	0.01	10	5	40	15
^{65}Zn	0.02	0.01	15	9	0.25	0.11	0.23	0.02	0.23	0.02	0.17	0.23	0.02	15	9	70	20
^{60}Co	0.01	0.01	10	5	0.17	0.06	0.11	0.01	0.11	0.01	0.08	0.11	0.01	10	5	30	15
^{40}K	0.10		150		2.50		0.90		0.90			0.90		150		400	
^{140}Ba-La	0.02		15		0.68		0.15		0.15			0.15		15		50	
^{140}Ba		0.02		25		0.34		0.07		0.07	0.30		0.07		25		50
^{140}La		0.01		7		0.08		0.02		0.02	0.10		0.02		7		15

*The NaI(Tl) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300 and Nucl. Instr. Methods 91, 533-40 (1971). These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on a given sample. Water is counted in a 3.5-l Marinelli beaker. Vegetation, fish, soil, and sediment are counted in a 1-pint container as dry weight. The average dry weight is 120 grams for vegetation and 400-500 grams for soil sediment and fish. Meat and poultry are counted in a 1-pint container as dry weight, then corrected to wet weight using an average moisture content of 70%. Average dry weight is 250 grams. Air particulates are counted in a well crystal. The counting system consists of a multichannel analyzer and either a 4" x 4" solid or 4" x 5" well NaI(Tl) crystal. The counting time is 4000 seconds. All calculations are performed by the least-squares computer program ALPHA-M. The assumption is made that all samples are analyzed within one week of the collection date.

**The Ge(Li) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300. These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on given samples. Water is counted in either a 0.5-L or 3.5-L Marinelli beaker. Solid samples, such as soil, sediment, and clam shells, are counted in a 0.5-L Marinelli beaker as dry weight. The average dry weight is 400-500 grams. Air filters and very small volume samples are counted in petri dishes centered on the detector endcap. The counting system consists of a ND-6620 multichannel analyzer and germanium detector having an efficiency of 20 percent. The counting time is normally 4-15 hours. All spectral analysis is performed using the software program HYPERMET. The assumption is made that all samples are analyzed within one week of the collection date.
Conversion factor: 1 pCi = 3.7×10^{-2} Bq.

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TABLE 4

RESULTS OBTAINED IN INTERLABORATORY COMPARISON PROGRAM

A. Air Filter (pCi/Filter)

Date	Gross Alpha		Gross Beta		Strontium-90		Cesium-137	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
11/83	19±9	<1[a]	50±9	40[a]	15±3	16	21±9	20
3/84	15±9	18	51±9	60	21±3	20	11±9	10
8/84	17±9	17	51±9	60	18±3	N/A[b]	15±9	15

B. Tritum in Urine (pCi/l)

Date	EPA value (±3σ)	TVA Avg.
2/84	2383±608	2466
11/84	2012±598	2047

a. Sample fouled in preparation. Procedure modified to prevent recurrence.
b. Lost in analysis.

TABLE 4 (Continued)

RESULTS OBTAINED IN INTERLABORATORY COMPARISON PROGRAM

C. Radiochemical Analysis of Water (pCi/1)

Date	Gross Alpha		Gross Beta		Strontium-89		Strontium-90		Tritium		Iodine-131	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
1/84	10±9	10	12±9	15	36±9	39	24±3	23				
3/84	5±9	6	20±9	20								
4/84									3508±630	3580	6±0.8	6
5/84	3±9	4	6±9	6	25±9	32	5±3	5				
6/84									3081±622	2770		
7/84	6±9	6	13±9	16								
8/84									2817±617	2607	34±10	36
9/84	5±9	5	16±9	12	34±9	41	19±3	18				
10/84									2810±617	2517		
10/84[c]	14±9	11	64±9	60	11±9	12	12±3	13				
11/84	7±9	8	20±9	22								
12/84									3182±624	3400	36±10	33

D. Gamma-Spectral Analysis of Water (pCi/1)

Date	Chromium-51		Cobalt-60		Zinc-65		Ruthenium-106		Cesium-134		Cesium-137	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
2/84	40±9	<44	10±9	11	50±9	50	61±9	53	31±9	29	16±9	15
6/84	66±9	72	31±9	32	63±9	66	29±9	<40	47±9	44	37±9	37
10/84	40±9	43	20±9	22	147±9	151	47±9	48	31±9	29	24±9	26
10/84[c]			14±9	17					2±9	<5	[illegible]±9	16

c. Laboratory performance evaluation study

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TABLE 4 (Continued)

RESULTS OBTAINED IN INTERLABORATORY COMPARISON PROGRAM

E. Foods (pCi/kg, Wet Weight)

Date	Strontium-89		Strontium-90		Iodine-131		Cesium-137		Potassium-40[d]	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
1/84	34±9	40	20±3	19	20±10	20	20±9	21	2730±236	2670
7/84	25±9	N/A[e]	20±3	N/A[e]	39±10	40	25±9	26	2605±226	2624

F. Milk (pCi/1)

Date	Strontium-89		Strontium-90		Iodine-131		Cesium-137		Potassium-40[f]	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
3/84					6±0.9	6				
6/84	25±9	24	17±3	18	43±10	39	35±9	34	1496±130	1483
10/84	22±9	26	16±3	15	42±10	40	32±9	30	1517±132	1563

d. Values reported as mg K/kg.
e. Lost in sample preparation.
f. Values reported as mg K/1.

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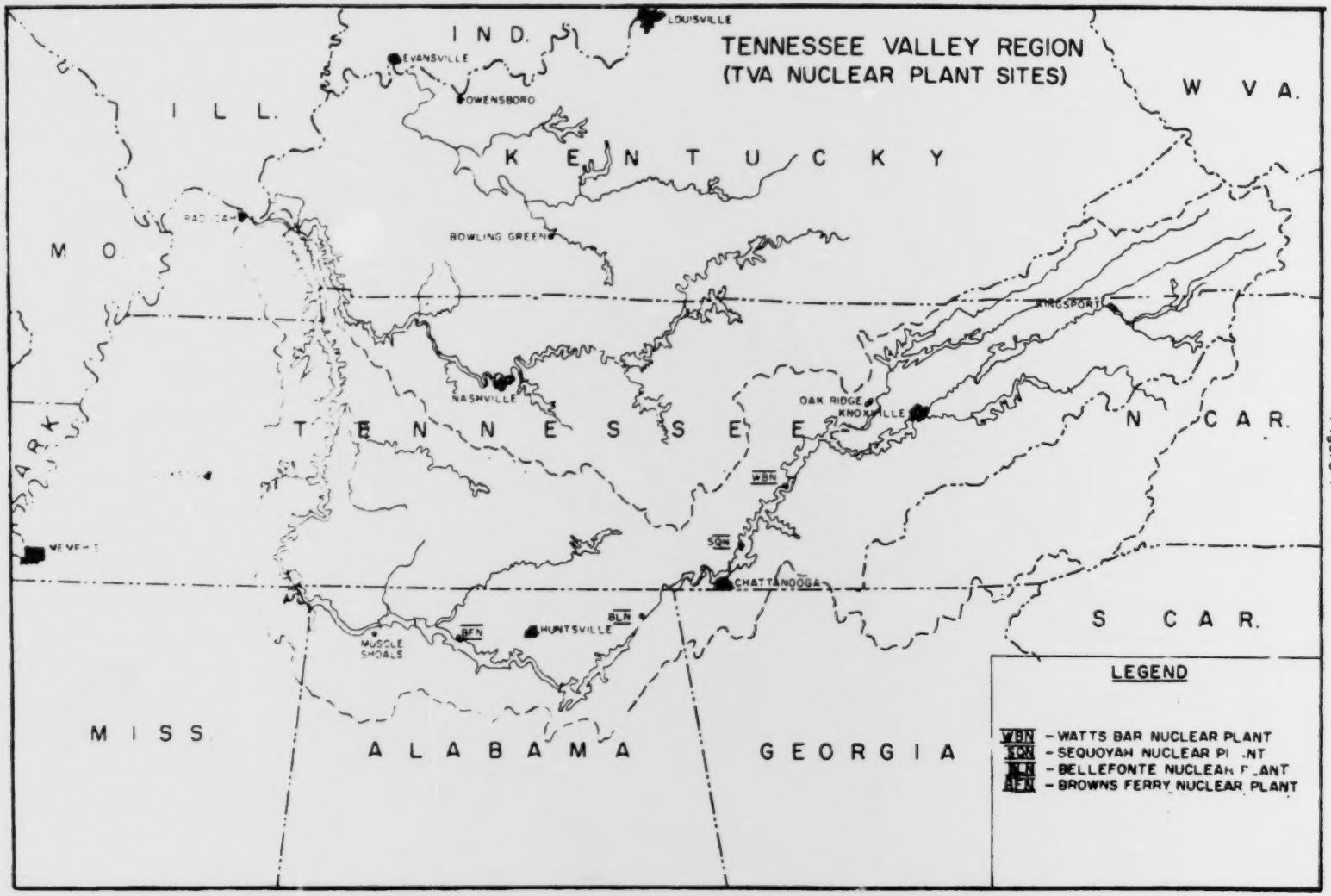
TENNESSEE VALLEY REGION
(TVA NUCLEAR PLANT SITES)
LOUISVILLE
EVANSVILLE
OWENSBORO
BOWLING GREEN
NASHVILLE
OAK RIDGE
KNOXVILLE
KINGSPORT
CHATTANOOGA
HUNTSVILLE
MUSCLE SHOALS
WBN
SQN
BLN
BFN
IND.
ILL.
KENTUCKY
W VA.
MO.
TENNESSEE
N CAR.
S CAR.
MISS.
ALABAMA
GEORGIA
LEGEND
WBN - WATTS BAR NUCLEAR PLANT
SQN - SEQUOYAH NUCLEAR PLANT
BLN - BELLEFONTE NUCLEAR PLANT
BFN - BROWNS FERRY NUCLEAR PLANT

Figure 1

10

Atmospheric Monitoring

The atmospheric monitoring network is divided into three subgroups. Two local air monitors are located within the plant boundary. Eight perimeter air monitors are located at distances out to 10.5 miles (16.9 kilometers) from the plant in the towns of Sale Creek, Daisy, Northwoods, Harrison, and four other populated areas. The remote air monitors used as control or baseline stations are located at distances out to 17.75 miles (28.6 kilometers) from the plant in the town of Dayton and the city of Chattanooga. See figures 2, 3, 4, and 5.

At each monitor, air is continuously pulled through a Hollingsworth and Voss LB 5211 glass fiber particulate filter at a flow rate of 3 ft^3/min (0.085 m^3/min). In series with, but downstream of the particulate filter, is a charcoal filter used to collect iodine. Each monitor has a collection tray and storage container to collect rainwater on a continuous basis, and a horizontal platform covered with gummed acetate to catch and hold heavy particle fallout. Moisture is collected from the atmosphere at each local monitor and at one remote monitor and analyzed for tritium.

Each of the local and perimeter air monitors is fitted with a GM tube that continuously scans the particulate filter. The disintegration rate of the atmospheric radioactivity is continuously recorded at each station. The data from the two local monitors and the four perimeter monitors located within approximately five miles of the plant are radiotelemetered into the plant control room.

Table 5 presents the maximum permissible concentrations (MPC) specified in 10 CFR 20 for nonoccupational exposure.

Air Filters

Air filters are collected weekly and analyzed for gross beta activity. Analyses are not performed until three days after sample collection. The samples are composited monthly for analysis of specific gamma-emitting radionuclides, and quarterly for ^{89}Sr and ^{90}Sr analysis. The results are presented in table 6. During this reporting period, seven weekly air filters were not collected, five because of equipment malfunction, and two because of flood conditions. Three weekly air filters were off the filter holder and were unusable. One monthly composite for gamma analysis was not obtainable because of reoccurring pump problems at one station.

The annual averages of the gross beta activity in the air particulate filters at the indicator stations (local and perimeter monitors) and at the control stations (remote monitors) for the years 1971-1984 are presented in figure 6. Increased levels due to fallout from atmospheric nuclear weapons testing are evident, especially in 1971, 1977, 1978, and 1981. These fluctuations are consistent with data from radiological monitoring programs conducted by TVA at non-operating nuclear power plant construction sites.

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Rainwater

Rainwater is collected monthly and analyzed for gross beta activity, specific gamma-emitting isotopes, strontium, and tritium. During this reporting period, one sample was not available for any analyses because of equipment failure, three samples were not available due to lack of rain, and one sample was inadvertently discarded before analysis. For the gross beta analysis, a maximum of 500 ml of the sample is boiled to dryness and counted. A gamma scan is performed on a 3.5-liter monthly sample. The strontium isotopes are separated chemically and counted in a low background system. The results are shown in table 7.

Heavy Particle Fallout

The gummed acetate that is used to collect heavy particle fallout is changed monthly. The samples are ashed and counted for gross beta activity. The results are given in table 8.

Charcoal Filter

Charcoal filters are collected weekly and analyzed for radioiodine. During this period, five samples were not obtained because of equipment malfunction and six samples were inadvertently lost or destroyed during collection and were unusable. One sample was inadvertently destroyed during processing. Flood conditions prevented collection of two samples. The filter is counted in a single channel analyzer system. The data are shown in table 9.

Atmospheric Moisture

An atmospheric moisture collection device containing a molecular sieve is located at each local monitor and at one remote monitor. Samples are taken every other week, the moisture driven off the molecular sieve, collected in a cold trap, distilled, and counted for tritium content. The results are shown in table 10. During this reporting period, eleven samples were not collected because of equipment malfunction. One sample collected was not usable because of insufficient volume, one sampler could not be installed because of flood conditions, and on two occasions samplers were not installed at any location.

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Table 5

MAXIMUM PERMISSIBLE CONCENTRATIONS

FOR NONOCCUPATIONAL EXPOSURE

	MPC	
	In Water pCi/l*	In Air pCi/m³*
Alpha	30	
Nonvolatile beta	3,000	100
Tritium	3,000,000	200,000
^{137}Cs	20,000	500
$^{103,106}Ru$	10,000	200
^{144}Ce	10,000	200
^{95}Zr-^{95}Nb	60,000	1,000
^{140}Ba-^{140}La	20,000	1,000
^{131}I	300	100
^{65}Zn	100,000	2,000
^{54}Mn	100,000	1,000
^{60}Co	30,000	300
^{89}Sr	3,000	300
^{90}Sr	300	30
^{51}Cr	2,000,000	80,000
^{134}Cs	9,000	400
^{58}Co	90,000	2,000

*1 pCi = 3.7×10^{-2} Bq.

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TABLE 6

RADIOACTIVITY IN AIR FILTER

PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON — TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b]	RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.010	0.02(480/ 511)	SALE CREEK, TN	0.02(45/ 48)		0.02(99/ 103)		
614		0.01- 0.05	10.5 MILES N	0.01- 0.04		0.01- 0.04		
GAMMA (GELI)								
155								
K-40	NOT ESTAB	0.02(62/ 129)	DAISY, TN	0.02(7/ 13)		0.02(16/ 26)		
		0.00- 0.04	5.5 MILES W	0.01- 0.03		0.00- 0.04		
PB-212	NOT ESTAB	0.00(31/ 129)	LM2 NORTHEAST	0.00(2/ 13)		0.00(5/ 26)		
		0.00- 0.00	0.75 MILES N	0.00- 0.00		0.00- 0.00		
BE-7	0.050	0.07(82/ 129)	COUNTY PARK, TN	0.07(8/ 13)		0.07(19/ 26)		
		0.05- 0.10	3.75 MILES SW	0.06- 0.10		0.05- 0.11		
TL-208	NOT ESTAB	0.00(28/ 129)	NORTHWOODS, TN	0.00(5/ 13)		0.00(5/ 26)		
		0.00- 0.00	10.5 MILES WSW	0.00- 0.00		0.00- 0.00		
AC-228	NOT ESTAB	0.00(10/ 129)	NORTHWOODS, TN	0.01(1/ 13)		0.00(2/ 26)		
		0.00- 0.01	10.5 MILES WSW	0.01- 0.01		0.00- 0.01		
PA-234M	NOT ESTAB	0.21(1/ 129)	LM2 NORTHEAST	0.21(1/ 13)		26 VALUES <LLD		
		0.21- 0.21	0.75 MILES N	0.21- 0.21				
SR 89	0.005	40 VALUES <LLD				3 VALUES <LLD		
46		ANALYSIS PERFORMED						
SR 90	0.001	40 VALUES <LLD				3 VALUES <LLD		
48		ANALYSIS PERFORMED						

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	2.300	3.72(43/ 126)	SALE CREEK, TN	4.52(4/ 13)	4.97(17/ 25)	
151		2.34- 9.69	10.5 MILES N	3.36- 5.81	2.48- 8.54	
GAMMA (GELI)						
151						
K-40	NOT ESTAB	17.16(11/ 126)	LM2 NORTHEAST	41.82(1/ 12)	19.34(3/ 25)	
		2.23- 41.82	0.75 MILES N	41.82- 41.82	8.65- 29.97	
BI-214	NOT ESTAB	5.73(63/ 126)	SALE CREEK, TN	8.99(5/ 13)	3.73(12/ 25)	
		0.09- 17.96	10.5 MILES N	0.26- 16.30	0.38- 11.10	
PB-214	NOT ESTAB	4.42(32/ 126)	HARRISON, TN	12.52(1/ 11)	4.58(6/ 25)	
		0.12- 13.54	8.75 MILES SSW	12.52- 12.52	2.15- 12.30	
PB-212	NOT ESTAB	1.58(29/ 126)	COUNTY PARK, TN	2.80(4/ 13)	1.15(8/ 25)	
		0.00- 7.70	3.75 MILES SW	0.76- 7.70	0.26- 3.14	
BE-7	NOT ESTAB	49.06(35/ 126)	HARRISON BAY, TN	59.92(1/ 13)	47.97(12/ 25)	
		21.13- 78.20	3.5 MILES SE	59.92- 59.92	25.35- 69.02	
SR 89	10.000	126 VALUES <LLD			25 VALUES <LLD	
151		ANALYSIS PERFORMED				
SR 90	2.000	126 VALUES <LLD			25 VALUES <LLD	
151		ANALYSIS PERFORMED				
TRITIUM	330.000	346.22(1/ 126)	COUNTY PARK, TN	346.22(1/ 13)	25 VALUES <LLD	
151		346.22- 346.22	3.75 MILES SW	346.22- 346.22		

a. Nominal Lower Limit of Detection (LLD) as described in table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 8

RADIOACTIVITY IN HEAVY PARTICLE FALLOUT

MCI/KM(2) - 37000000.00 BQ/KM(2)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 156	0.050	0.16(130/ 130) 0.05- 1.54	LM2 NORTHEAST 0.75 MILES N	0.31(13/ 13) 0.08- 1.54	0.16(25/ 26) 0.05- 0.52	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 9

RADIOACTIVITY IN CHARCOAL FILTERS

PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a]	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE-131	0.010	0.02(137/ 508)	WORK, TN	0.02(8/ 51)	0.01(29/ 102)	
610		0.01- 0.33	4.5 MILES NNE	0.01- 0.03	0.01- 0.03	

a. Nominal Lower Limit of Detection (LLD) as described in table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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(7)

TABLE 10

RADIOACTIVITY IN ATMOSPHERIC MOISTURE

PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
TRITIUM	NOT ESTAB	1.86(557/ 43)	LM2 NORTHEAST	2.47(17/ 21)	0.54(127/ 15)	
59		0.03- 14.34	0.75 MILES N	0.19- 14.34	0.12- 3.72	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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Figure 2

ATMOSPHERIC AND TERRESTRIAL MONITORING NETWORK

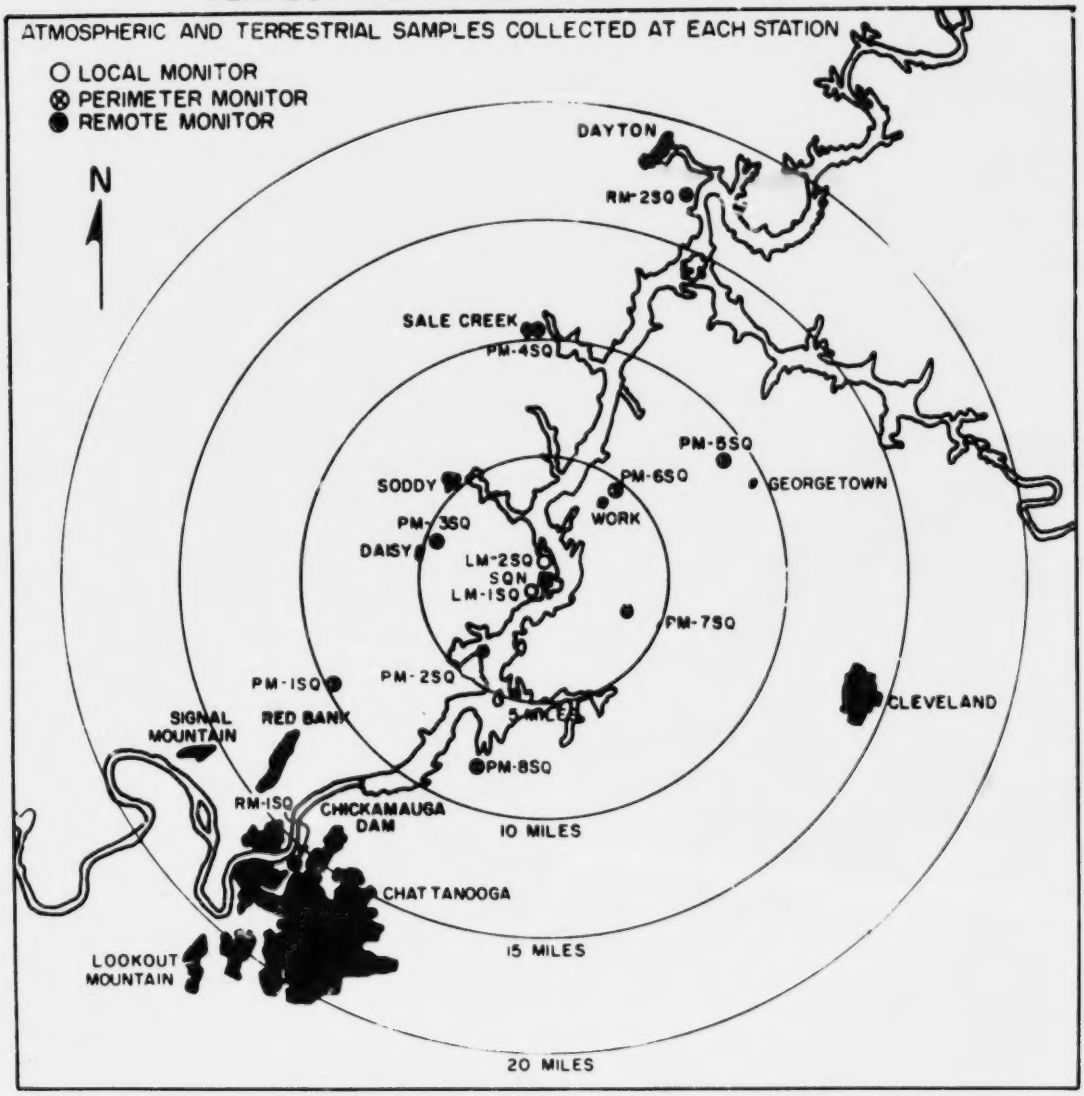

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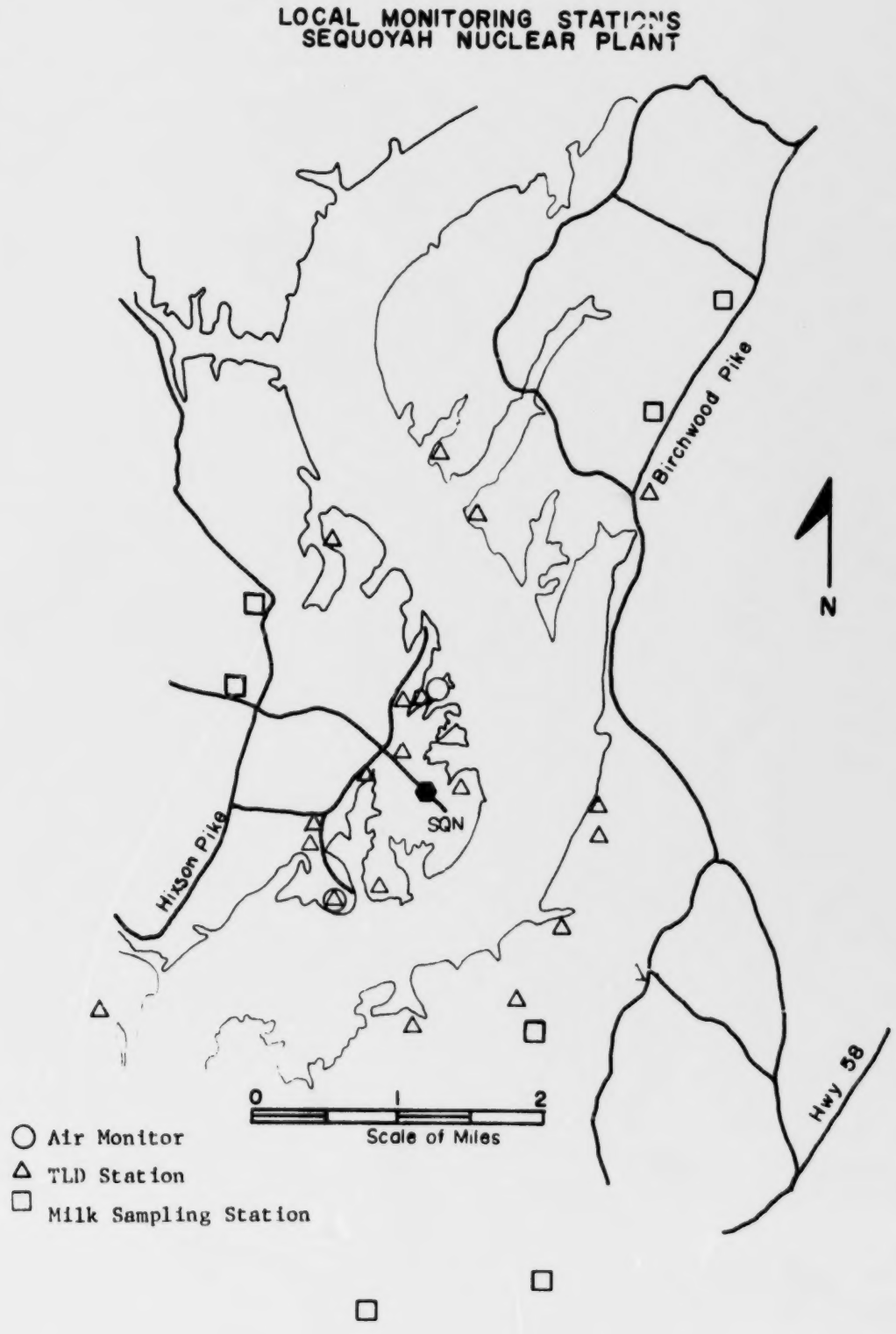
FIGURE 3



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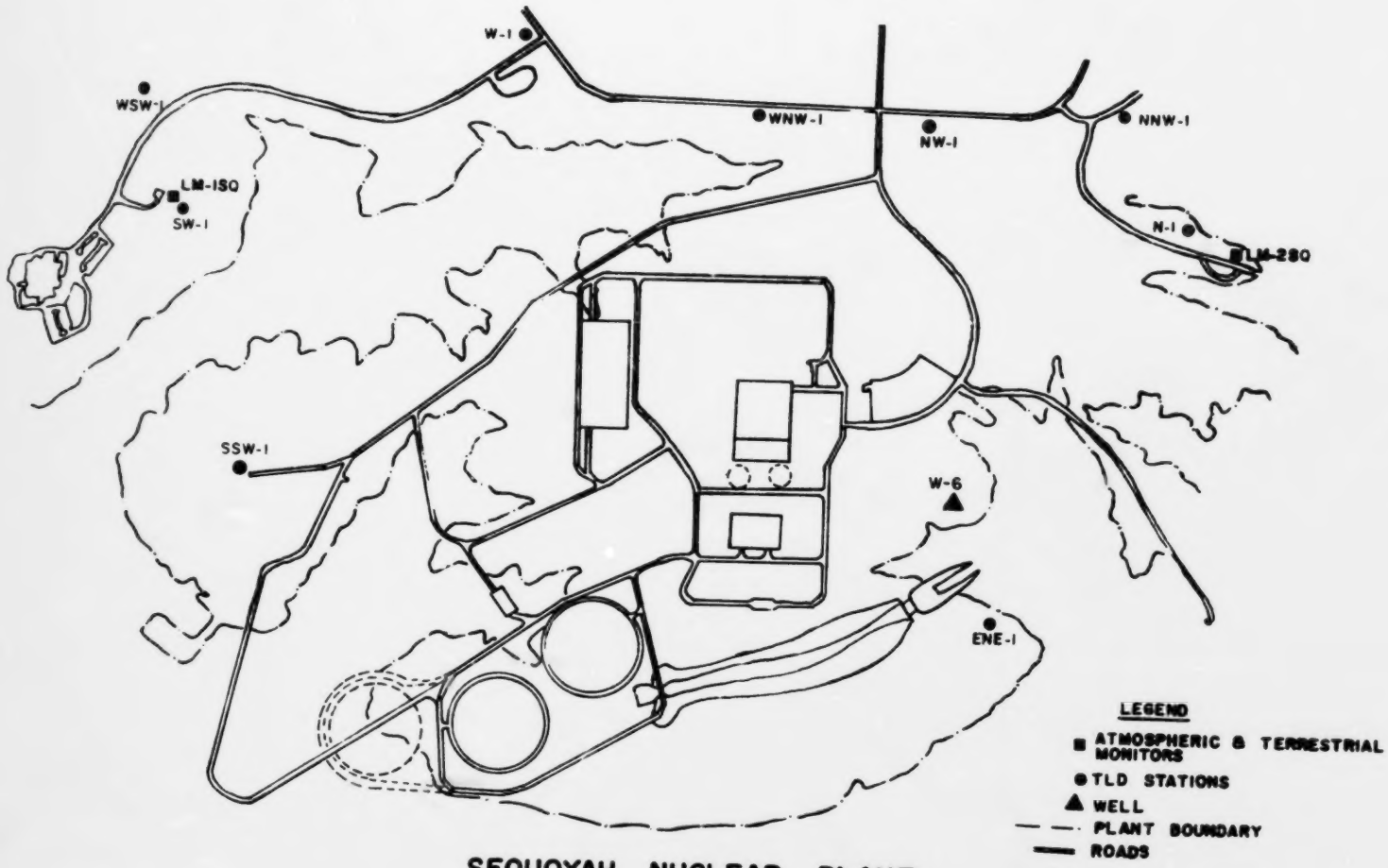

SEQUOYAH NUCLEAR PLANT
SITE MONITORING STATIONS

Figure 4

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Figure 5

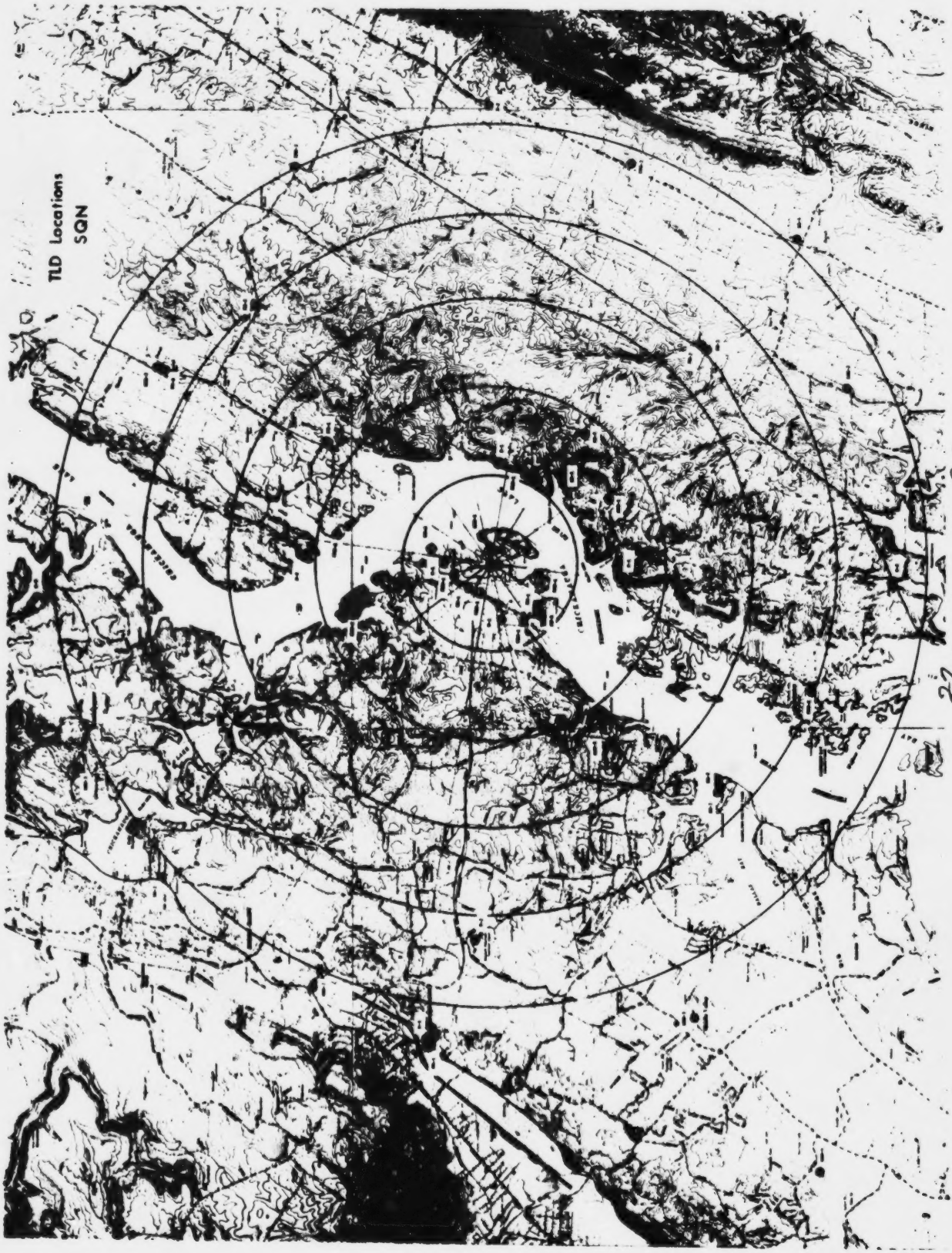

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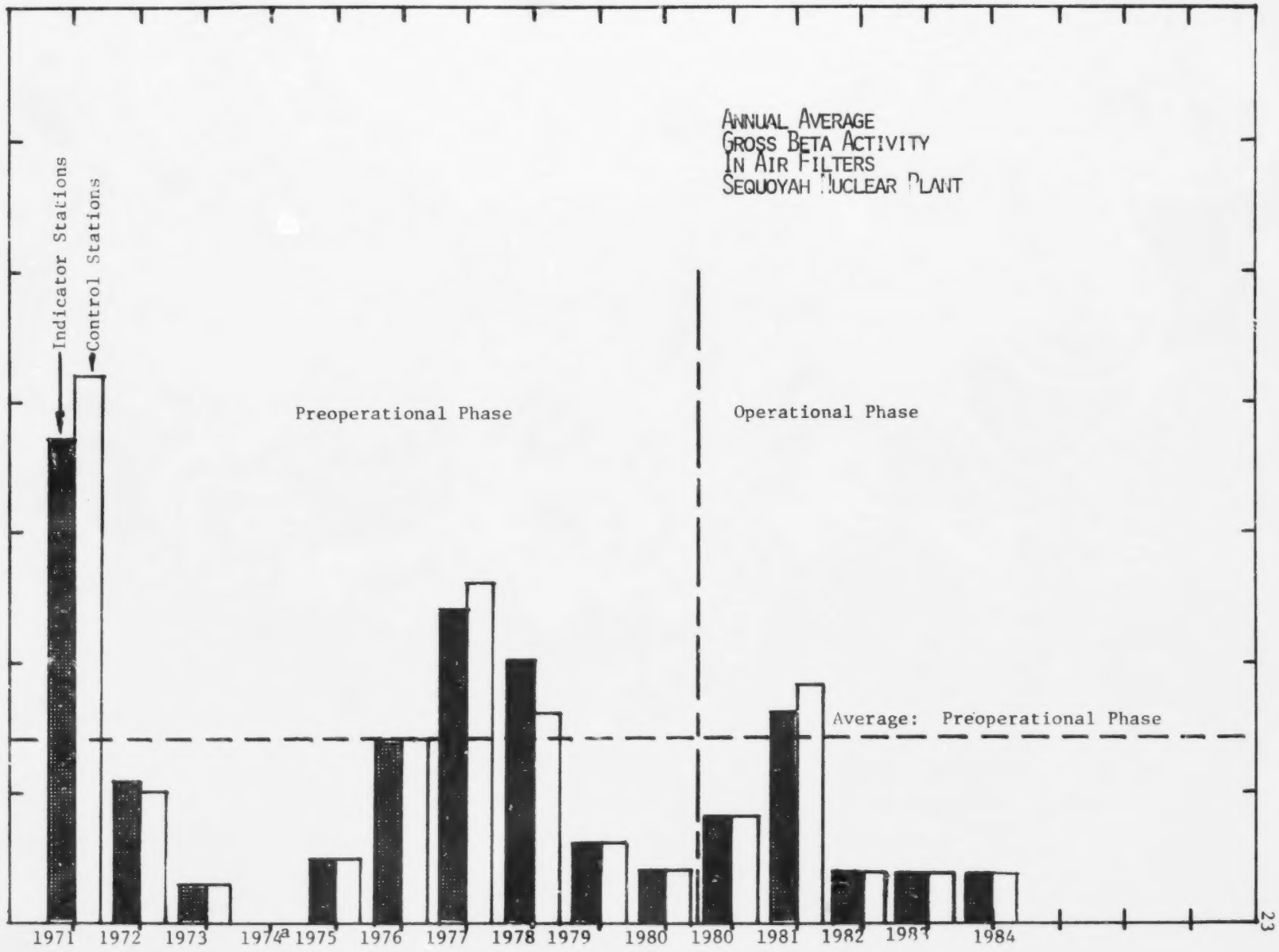
Figure 6



a. Data not collected in 1974.

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Terrestrial Monitoring

Terrestrial monitoring is accomplished by collecting environmental media at locations within the general area of the plant for indicators and at locations remote to the plant for controls. In addition to milk, samples include vegetation, soil, ground water, public water, food crops, and poultry. Environmental gamma radiation levels are determined by strategic placement of thermoluminescent dosimeters. Once each year, a land use survey is conducted to determine census and location of milk producing animals.

Land Use Survey

The routine land use survey was conducted in the summer of 1984. Results of the survey identified one farm which should be included in the sampling program. The farm is located east of the plant at a distance of 1.7 miles. This location, with only one milk producing animal, will be added to the sampling program as a monthly vegetation sampling site.

It was concluded from an evaluation of the survey results that the small changes in land use have not increased the projected doses to individuals in the area and that appropriate sampling was conducted.

Milk

Milk samples were routinely collected from four indicator locations (two of which are commerical daries), and from three control locations. Raw milk was analyzed weekly for iodine-131 and monthly for gamma-emitting radioisotopes and strontium content. Table 11 summarizes the analytical results. During this reporting period, 18 samples were not available for collection, resulting in 18 iodine, 11 gamma, and 6 strontium analyses not done.

Three other locations added to the sampling program as a result of the 1983 land use survey intermittently provided goat milk samples. At one of these locations, the owner removed the goats from the area (with milk samples unavailable, vegetation samples were collected monthly). This location was subsequently removed from the sampling program with a Special Report submitted to the Nuclear Regulatory Commission on December 10, 1984. Analytical data of milk samples that were collected are included in table 11.

During a routine comparison between SQN technical specifications and the SQN Offsite Dose Calculation Manual (ODCM), a discrepancy was revealed between analytical frequency requirements and actual ODCM analytical frequency for milk samples. The technical specifications specified that each milk sample routinely receives a gamma scan for isotopic identification. The ODCM specified the gamma scan on milk samples to be performed at least once per 31 days. The ODCM was corrected. TVA immediately began to perform a gamma scan on each milk sample collected for SQN in accordance with the technical specification requirement.

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As has been noted in previous reports, the levels of ^{90}Sr in milk samples from farms producing milk for private consumption only are up to six times the levels found in milk from commercial dairy farms. Samples of feed and water supplied to the animals were analyzed in 1979 in an effort to determine the source of the strontium. Analysis of dried hay samples indicated levels of ^{90}Sr slightly higher than those encountered in routine vegetation samples. Analysis of pond water indicated no significant strontium activity.

This phenomenon was observed during preoperational radiological monitoring near Sequoyah and Bellefonte Nuclear Plants at farms where only one or two cows were being milked for private consumption of the milk. It is postulated that the feeding practices of these small farmers differ from those of the larger dairy farmers to the extent that fallout from atmospheric nuclear weapons testing may be more concentrated in these instances. Similarly, Hansen, et al., reported an inverse relationship between the levels of ^{90}Sr in milk and the quality of fertilization and land management.[a]

Vegetation

Vegetation samples were collected quarterly from four farms from which milk samples were collected and analyzed for gamma-emitting radionuclides and strontium. Monthly vegetation sampling was conducted at six additional locations and at three control farms. The monthly samples were analyzed for gamma-emitting radionuclides with quarterly analyses for strontium. Approximately 1-2 kg of grass was broken or cut at ground level and returned for analysis. Efforts were made to sample vegetation that was representative of the pasturage where animals graze. Table 12 gives the results obtained from the laboratory analyses.

Soil

Soil samples were collected annually near each monitoring station to provide an indication of any long-term buildup of radioactivity in the environment. Two additional samples were taken at one of the control stations in conjunction with the Watts Bar Nuclear Plant radiological monitoring program. An auger, or "cookie cutter" type sampler was used to obtain samples of the top two inches (5 cm) of soil. These samples were analyzed for gross beta activity, gamma-emitting radionuclides, ^{89}Sr and ^{90}Sr. The results are given in table 13.

Groundwater

An automatic sequential-type sampling device collected groundwater from a well downgradient from Sequoyah Nuclear Plant. A composite sample from this well was analyzed for gross beta activity

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[a]Hansen, W.G., et al., Farming Practices and Concentrations of Emission Products in Milk, U.S. Department of Health, Education, and Welfare; Public Health Service Publication No. 999-R-6, May 1964.

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and gamma-emitting radionuclides monthly, and composited quarterly for determination of tritium. A grab sample was also taken from a farm near the plant, and a control well across the river from the plant. The results of the analysis of well water are shown in table 14. During this reporting period, one sample for gross beta activity and gamma-emitting radionuclide analysis was not collected due to personnel error.

Public Water

Potable water supplies taken from the Tennessee River in the vicinity of Sequoyah Nuclear Plant were sampled and analyzed monthly for gross beta and gamma-emitting radionuclides. Tritium, ^{89}Sr, and ^{90}Sr concentrations were determined in quarterly composite samples. The first potable water supply downstream from the plant is equipped with an automatic sampler with composite samples analyzed monthly. The results are shown in table 15. During this reporting period, one sample was not collected because of equipment malfunction, and one sample was inadvertently destroyed during analysis.

Figure 7 shows the trends in gross beta activity in drinking water from 1971 through 1984. The annual averages reported in 1984 are consistent with the patterns established in the preoperational phase of the monitoring program and are slightly lower than levels reported in surface water samples (figure 11).

Environmental Gamma Radiation Levels

Bulb-type Victoreen manganese-activated calcium fluoride (Ca_2F: Mn) thermoluminescent dosimeters (TLDs) were placed at 16 stations around the plant near the site boundary, at the perimeter and remote air monitors, and at 22 additional stations approximately 5 miles from the site to determine the gamma exposure rates at these locations. The dosimeters, located within energy compensating shields to correct for energy dependence, are placed approximately one meter above the ground, with three TLDs at each station. They are annealed and read with a Victoreen model 2810 TLD reader. The values are corrected for gamma response, self-irradiation, and fading, with individual gamma response calibrations and self-irradiation factors determined for each TLD. The TLDs are exchanged every three months. The quarterly gamma radiation levels determined from these TLDs are given in table 16, which indicates that average levels at onsite stations are approximately 2-5 mR/quarter higher than levels at offsite stations. This is consistent with levels reported at TVA's nonoperating nuclear power plant construction sites where the average radiation levels onsite are generally 2-6 mR/quarter higher than levels offsite. The causes of these differences have not been completely isolated; however, it is postulated that the differences are probably attributable to combinations of influences, such as natural variations in environmental radiation levels, earth moving activities onsite, the mass of concrete employed in the construction of the plant, and other undetermined influences.

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Figure 8 compares plots of the data from the onsite or site boundary stations with those from the offsite stations over the period from 1976 through 1984. To reduce the variations present in the data sets, a four-quarter moving average was constructed for each set. Figure 9 presents a trend plot of the direct radiation levels as defined by the moving averages. The data follow the same general trend as the raw data, but the curves are smoothed considerably.

Prior to 1976, measurements were made with less sensitive dosimeters, and consequently the levels reported in this phase of the preoperational monitoring program are 1-2 times the levels reported herein. Those data are not included in this report.

Food Crops and Poultry

Food crops and poultry raised in the vicinity of SQN were sampled annually as they became available during the growing season. During this sampling period, samples of cabbage, corn, green beans, potatoes, tomatoes, and turnip greens were collected and analyzed for gross beta and specific gamma-emitting radionuclides. Poultry samples were collected and analyzed for gross beta activity and gamma-emitting radionuclides. The results are given in tables 17 through 23.

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TABLE 11

RADIOACTIVITY IN MILK

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE-131 373	0.500	222 VALUES <LLD ANALYSIS PERFORMED			151 VALUES <LLD	
GAMMA (GELI) 149						
CS-137	5.000	7.29(7/ 85)	SUTTON FARM	9.97(2/ 4)	64 VALUES <LLD	
		5.22- 12.48	3.25 MILES	7.46- 12.48		
K-40	NOT ESTAB	164.43(85/ 85)	SUTTON FARM	2025.61(4/ 4)	1228.69(63/ 64)	
		481.55- 2737.83	3.25 MILES	1635.27- 2737.83	782.09- 1513.56	
BI-214	NOT ESTAB	7.22(54/ 85)	SUTTON FARM	10.44(4/ 4)	46.56(45/ 64)	
		0.78- 34.21	3.25 MILES	3.80- 25.22	1.62- 186.32	
PB-214	NOT ESTAB	7.93(26/ 85)	SUTTON FARM	15.42(1/ 4)	54.11(38/ 64)	
		1.40- 18.51	3.25 MILES	15.42- 15.42	0.33- 189.55	
PB-212	NOT ESTAB	3.02(24/ 85)	LOVELL FARM	3.19(7/ 22)	1.91(17/ 64)	
		0.77- 5.96	2.75 MILES NNE	1.05- 5.21	0.65- 5.43	
TL-208	NOT ESTAB	1.81(16/ 85)	H WALKER FARM	2.13(3/ 21)	1.23(8/ 64)	
		0.28- 3.88	1.25 MILES NW	0.44- 3.74	0.33- 2.78	
AC-228	NOT ESTAB	4.85(8/ 85)	JONES FARM	6.14(2/ 14)	4.99(5/ 64)	
		1.27- 10.47	1.25 MILES W	1.81- 10.47	2.09- 10.40	
SR 89	10.000	55 VALUES <LLD			36 VALUES <LLD	
91		ANALYSIS PERFORMED				
SR 90	2.000	7.91(54/ 55)	JONES FARM	13.87(11/ 11)	2.55(26/ 36)	
91		2.10- 22.90	1.25 MILES W	7.48- 22.90	2.01- 3.47	

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a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 12

RADIOACTIVITY IN VEGETATION

PCI/G - C.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY DAYLLION TENNESSEE — REPORTING PERICD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED GAMMA (GELI)	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CS-137	0.060	C.15(26/ 94) C.06- 0.41	SUTTON FARM 3.25 MILES	0.23(2/ 13) 0.07- C.40	0.06(3/ 39) 0.07- C.11	
K-40	NOT ESTAB	17.23(94/ 94) 1.27- 51.29	LOVELL FARM 2.75 MILES NNE	29.60(4/ 4) 20.91- 40.33	19.87(39/ 39) 2.96- 42.35	
BI-214	0.100	C.18(41/ 94) C.11- 0.46	H WALKER FARM 1.25 MILES NW	0.28(3/ 4) 0.20- 0.46	0.18(15/ 39) 0.10- C.37	
BI-212	NOT ESTAB	C.39(3/ 94) C.35- 0.44	EDGAR MALONE FAR 2.5 MILES N	0.44(1/ 13) 0.44- 0.44	59 VALUES <LLD	
PB-214	NOT ESTAB	C.15(80/ 94) C.01- 0.33	BRADY FARM 2.25 MILES SSW	0.16(10/ 13) C.C2- 0.33	0.12(27/ 39) 0.02- C.38	
PB-212	NOT ESTAB	C.06(77/ 94) C.CC- 0.19	GOINS FARM 1.5 MILES NNW	C.C8(12/ 13) 0.CC- 0.17	0.07(28/ 39) 0.01- C.35	
BE-7	NOT ESTAB	3.91(93/ 94) C.97- 22.45	EDGAR MALONE FAR 2.5 MILES N	11.61(13/ 13) 2.56- 18.46	7.59(39/ 39) 1.80- 29.14	
TL-208	NOT ESTAB	C.C5(51/ 94) C.CC- 0.09	SMITH FARM 1.75 MILES SE	C.C4(5/ 13) C.C2- C.09	0.04(18/ 39) 0.00- C.11	
AC-228	NOT ESTAB	C.14(34/ 94) C.00- 0.35	GOINS FARM 1.5 MILES NNW	0.19(7/ 13) 0.C1- 0.35	0.1c(12/ 39) 0.01- C.3c	
PA-234M	NOT ESTAB	4.41(1/ 94) 4.41- 4.41	MALONE FARM 3.5 MILES NNE	4.41(1/ 4) 4.41- 4.41	6.18(1/ 39) 6.18- 6.18	
SR-89	0.250	C.33(2/ 40) C.30- C.37	BRADY FARM 2.25 MILES SSW	0.37(1/ 4) 0.37- C.37	0.27(3/ 12) 0.2c- C.28	
SR-90	0.050	C.28(39/ 40) C.06- 1.34	GOINS FARM 1.5 MILES NNW	0.65(4/ 4) 0.25- 1.34	0.09(11/ 12) 0.05- C.13	

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a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 13

RADIOACTIVITY IN SOIL

PCI/G - C.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.700	29.95(10/ 10)	GEORGETOWN, TN	56.56(1/ 1)	19.24(4/ 4)	
14		19.83- 56.56	9.0 MILES ENE	56.56- 56.56	11.38- 37.14	
GAMMA (GELI)						
14						
CS-137	0.020	0.42(10/ 10)	WORK, TN	0.99(1/ 1)	0.45(4/ 4)	
		0.06- 0.99	4.5 MILES NNE	0.99- 0.99	0.28- 0.72	
K-40	0.250	8.00(10/ 10)	GEORGETOWN, TN	18.47(1/ 1)	3.99(4/ 4)	
		2.26- 18.47	9.0 MILES ENE	18.47- 18.47	2.53- 8.01	
BI-214	0.050	0.82(10/ 10)	LM1 SOUTHWEST	1.09(1/ 1)	0.73(4/ 4)	
		0.37- 1.09	0.75 MILES SW	1.09- 1.09	0.66- 0.81	
BI-212	0.100	1.01(10/ 10)	GEORGETOWN, TN	1.36(1/ 1)	0.75(4/ 4)	
		0.42- 1.36	9.0 MILES ENE	1.36- 1.36	0.63- 1.03	
PB-214	0.050	0.92(10/ 10)	LM1 SOUTHWEST	1.20(1/ 1)	0.80(4/ 4)	
		0.44- 1.20	0.75 MILES SW	1.20- 1.20	0.73- 0.91	
PB-212	NOT ESTAB	0.91(10/ 10)	GEORGETOWN, TN	1.31(1/ 1)	0.65(4/ 4)	
		0.37- 1.31	9.0 MILES ENE	1.31- 1.31	0.53- 0.93	
RA-226	0.050	0.82(10/ 10)	LM1 SOUTHWEST	1.09(1/ 1)	0.73(4/ 4)	
		0.37- 1.09	0.75 MILES SW	1.09- 1.09	0.66- 0.81	
RA-223	NOT ESTAB	0.27(1/ 10)	DAISY, TN	0.27(1/ 1)	4 VALUES <LLD	
		0.27- 0.27	5.5 MILES W	0.27- 0.27		
RA-224	NOT ESTAB	1.09(8/ 10)	LM1 SOUTHWEST	1.42(1/ 1)	0.84(2/ 4)	
		0.82- 1.42	0.75 MILES SW	1.42- 1.42	0.65- 1.02	
TL-208	0.020	0.32(10/ 10)	GEORGETOWN, TN	0.48(1/ 1)	0.22(4/ 4)	
		0.12- 0.48	9.0 MILES ENE	0.48- 0.48	0.18- 0.31	
AC-228	0.060	0.96(10/ 10)	GEORGETOWN, TN	1.41(1/ 1)	0.68(4/ 4)	
		0.43- 1.41	9.0 MILES ENE	1.41- 1.41	0.54- 0.98	
PA-234M	NOT ESTAB	2.43(4/ 10)	WORK, TN	2.79(1/ 1)	2.00(1/ 4)	
		2.19- 2.79	4.5 MILES NNE	2.79- 2.79	2.00- 2.00	
SR 89	1.500	3.28(7/ 10)	SALE CREEK, TN	5.73(1/ 1)	4.63(2/ 4)	
14		2.13- 5.73	10.5 MILES N	5.73- 5.73	4.20- 5.07	
SR 90	0.300	10 VALUES <LLD			4 VALUES <LLD	
14		ANALYSIS PERFORMED				

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a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 14

RADIOACTIVITY IN WELL WATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	2.300	3.32(7/ 26)	MAYS FARM	3.85(4/ 13)	3.77(12/ 12)	
38		2.41- 8.10	0.75 MILES W	2.42- 8.10	2.92- 4.80	
GAMMA (GELI)						
38						
K-40	NOT ESTAB	14.65(5/ 26)	MAYS FARM	16.24(3/ 13)	13.66(3/ 12)	
		0.78- 24.17	0.75 MILES W	3.97- 24.17	8.42- 20.13	
BI-214	NOT ESTAB	27.30(22/ 26)	MAYS FARM	41.25(12/ 13)	47.89(11/ 12)	
		3.41- 109.87	0.75 MILES W	3.41- 109.87	3.73- 75.62	
PB-214	NOT ESTAB	29.56(20/ 26)	MAYS FARM	48.83(10/ 13)	44.75(11/ 12)	
		0.60- 114.00	0.75 MILES W	7.20- 114.00	6.06- 75.19	
PB-212	NOT ESTAB	1.08(8/ 26)	MAYS FARM	1.03(4/ 13)	1.27(4/ 12)	
		0.28- 2.71	0.75 MILES W	0.28- 1.73	0.53- 1.91	
TL-208	NOT ESTAB	1.29(8/ 26)	SQN WELL #6	1.37(3/ 13)	2.11(3/ 12)	
		0.42- 2.36	ONSITE NNE	0.84- 2.36	1.79- 2.68	
AC-228	NOT ESTAB	3.49(2/ 26)	MAYS FARM	3.49(2/ 13)	6.61(2/ 12)	
		2.64- 4.34	0.75 MILES W	2.64- 4.34	4.91- 8.32	
TRITIUM	330.000	8 VALUES <LLD			4 VALUES <LLD	
12		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 15

RADIOACTIVITY IN PUBLIC WATER SUPPLY

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)[a]	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	2.300	2.90(25/ 51)	DAISY, TN	3.59(3/ 12)	3.59(11/ 25)	
76		2.31- 5.62	5.5 MILES W	2.44- 5.62	2.37- 6.67	
GAMMA (GELI)						
76						
K-40	NOT ESTAB	15.92(7/ 51)	OF INDUSTRIES	21.34(2/ 13)	9.59(2/ 25)	
		0.34- 40.32	TRM 473.0	2.37- 40.32	0.33- 18.82	
BI-214	NOT ESTAB	16.85(34/ 51)	DAISY, TN	38.61(12/ 12)	4.88(13/ 25)	
		0.00- 120.63	5.5 MILES W	9.14- 120.63	0.51- 16.16	
PB-214	NOT ESTAB	21.40(21/ 51)	DAISY, TN	34.02(12/ 12)	8.68(5/ 25)	
		0.70- 123.81	5.5 MILES W	3.89- 123.81	4.37- 14.09	
PB-212	NOT ESTAB	2.09(13/ 51)	CHICKAMAUGA DAM	3.35(4/ 13)	1.93(9/ 25)	
		0.24- 5.08	TRM 465.3	1.81- 5.08	0.07- 5.32	
TL-208	NOT ESTAB	1.01(10/ 51)	CHICKAMAUGA DAM	1.21(3/ 13)	0.85(6/ 25)	
		0.21- 2.67	TRM 465.3	0.22- 2.67	0.11- 2.18	
AC-228	NOT ESTAB	4.26(3/ 51)	E.I. DUPONT	5.97(1/ 13)	3.71(3/ 25)	
		1.13- 5.97	TRM 473.3	5.97- 5.97	0.85- 8.16	
SR 89	10.000	16 VALUES <LLD			8 VALUES <LLD	
24		ANALYSIS PERFORMED				
SR 90	2.000	16 VALUES <LLD			8 VALUES <LLD	
24		ANALYSIS PERFORMED				
TRITIUM	330.000	448.31(2/ 16)	CHICKAMAUGA DAM	450.09(1/ 4)	8 VALUES <LLD	
24		446.53- 450.09	TRM 465.3	450.09- 450.09		

a. Nominal Lower Limit of Detection (LLD) as described in table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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Table 16

ENVIRONMENTAL GAMMA RADIATION LEVELS

Average External Gamma Radiation Levels at Various Distances from Sequoyah Nuclear Plant for Each Quarter - 1984
mR/Quarter[a]

Distance Miles	Average External Gamma Radiation Levels[b]			
	1st Quarter (Feb-Apr 84)	2nd Quarter (May-Jul 84)	3rd Quarter (Aug-Oct 84)	4th Quarter (Nov 84-Jan 85)
0-1	18.0±1.7	20.3±1.9	23.4±2.1	22.7±3.0
1-2	15.6±2.9	16.8±3.6	18.2±6.0	18.6±3.9
2-4	15.2±2.2	16.5±3.2	16.0±4.6	17.9±2.8
4-6	15.2±2.0	16.7±2.4	16.9±4.0	18.0±2.5
>6	15.3±1.7	16.6±1.9	16.4±3.9	17.9±2.3
Average, 0-2 miles (Onsite)	17.1±2.5	18.9±3.1	21.5±4.6	21.1±3.9
Average, >2 miles (Offsite)	15.3±2.0	16.6±2.4	16.6±3.9	17.9±2.3

[a] Date normalized to one quarter (2190 hours)

[b] All averages reported ±1σ (68% confidence level)

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TABLE 17

RADIOACTIVITY IN CABBAGE

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1986

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	3000.55(1/ 1) 3000.55- 3000.55	H WALKER FARM 1.25 MILES NW	3000.55(1/ 1) 3000.55- 3000.55	2701.36(1/ 1) 2701.36- 2701.36	
GAMMA (GELI) [2]						
CS-137	5.000	1 VALUES <LLD			5.16(1/ 1) 5.16- 5.16	
K-40	NOT ESTAB	1500.83(1/ 1) 1500.83- 1500.83	H WALKER FARM 1.25 MILES NW	1500.83(1/ 1) 1500.83- 1500.83	1378.81(1/ 1) 1378.81- 1378.81	
BI-214	NOT ESTAB	1 VALUES <LLD			3.38(1/ 1) 3.38- 3.38	
PB-214	NOT ESTAB	4.98(1/ 1) 4.98- 4.98	H WALKER FARM 1.25 MILES NW	4.98(1/ 1) 4.98- 4.98	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 18

RADIOACTIVITY IN CORN

PCI/KG - C.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 2	25.000	4467.33(1/ 1) 4467.33- 4467.33	M WALKER FARM 1.25 MILES NW	4467.33(1/ 1) 4467.33- 4467.33	3910.00(1/ 1) 3910.00- 3910.00	
GAMMA (GELI) 2						
K-40	NOT ESTAB	2237.29(1/ 1) 2237.29- 2237.29	M WALKER FARM 1.25 MILES NW	2237.29(1/ 1) 2237.29- 2237.29	1918.43(1/ 1) 1918.43- 1918.43	
BI-214	NOT ESTAB	4.01(1/ 1) 4.01- 4.01	M WALKER FARM 1.25 MILES NW	4.01(1/ 1) 4.01- 4.01	1.60(1/ 1) 1.60- 1.60	
PB-214	NOT ESTAB	1.84(1/ 1) 1.84- 1.84	M WALKER FARM 1.25 MILES NW	1.84(1/ 1) 1.84- 1.84	1.94(1/ 1) 1.94- 1.94	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 19

RADIOACTIVITY IN GREEN BEANS

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON, TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	4426.88(1/ 1)	H WALKER FARM	4426.88(1/ 1)	4451.97(1/ 1)	
2		4426.88- 4426.88	1.25 MILES NW	4426.88- 4426.88	4451.97- 4451.97	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	1753.93(1/ 1)	H WALKER FARM	1753.93(1/ 1)	2019.96(1/ 1)	
		1753.93- 1753.93	1.25 MILES NW	1753.93- 1753.93	2019.96- 2019.96	
BI-214	NOT ESTAB	1.86(1/ 1)	H WALKER FARM	1.86(1/ 1)	5.09(1/ 1)	
		1.86- 1.86	1.25 MILES NW	1.86- 1.86	5.09- 5.09	
PB-214	NOT ESTAB	3.19(1/ 1)	H WALKER FARM	3.19(1/ 1)	1.88(1/ 1)	
		3.19- 3.19	1.25 MILES NW	3.19- 3.19	1.88- 1.88	

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a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 20

RADIOACTIVITY IN POTATOES

PCI/KG - C.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON, TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME, DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	3640.07(1/ 1)	M WALKER FARM	3640.07(1/ 1)	7290.13(1/ 1)	
2		3640.07- 3640.07	1.25 MILES NW	3640.07- 3640.07	7290.13- 7290.13	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	3494.79(1/ 1)	M WALKER FARM	3494.79(1/ 1)	3391.75(1/ 1)	
		3494.79- 3494.79	1.25 MILES NW	3494.79- 3494.79	3391.75- 3391.75	
BI-214	NOT ESTAB	11.50(1/ 1)	M WALKER FARM	11.50(1/ 1)	8.15(1/ 1)	
		11.50- 11.50	1.25 MILES NW	11.50- 11.50	8.15- 8.15	
PB-214	NOT ESTAB	1.04(1/ 1)	M WALKER FARM	1.04(1/ 1)	9.03(1/ 1)	
		1.04- 1.04	1.25 MILES NW	1.04- 1.04	9.03- 9.03	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 21

RADIOACTIVITY IN TOMATOES

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON, TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	1524.57(1/ 1)	H WALKER FARM	1524.57(1/ 1)	4348.34(1/ 1)	
2		1524.57- 1524.57	1.25 MILES NW	1524.57- 1524.57	4348.84- 4348.34	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	2365.41(1/ 1)	H WALKER FARM	2365.41(1/ 1)	2120.08(1/ 1)	
		2365.41- 2365.41	1.25 MILES NW	2365.41- 2365.41	2120.08- 2120.08	
PB-212	NOT ESTAB	0.33(1/ 1)	H WALKER FARM	0.33(1/ 1)	1 VALUES <LLD	
		0.33- 0.33	1.25 MILES NW	0.33- 0.33		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 22

RADIOACTIVITY IN TURNIP GREENS

PCI/KG - C.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 2	25.000	4725.03(1/ 1) 4725.03- 4725.03	H WALKER FARM 1.25 MILES NW	4725.03(1/ 1) 4725.03- 4725.03	7395.17(1/ 1) 7395.17- 7395.17	
GAMMA (GELI) 2						
K-40	NOT ESTAB	1973.76(1/ 1) 1973.76- 1973.76	H WALKER FARM 1.25 MILES NW	1973.76(1/ 1) 1973.76- 1973.76	2979.16(1/ 1) 2979.16- 2979.16	
BI-214	NOT ESTAB	1 VALUES <LLD			12.71(1/ 1) 12.71- 12.71	
PB-214	NOT ESTAB	1 VALUES <LLD			5.11(1/ 1) 5.11- 5.11	
PB-212	NOT ESTAB	6.03(1/ 1) 6.03- 6.03	H WALKER FARM 1.25 MILES NW	6.03(1/ 1) 6.03- 6.03	9.94(1/ 1) 9.94- 9.94	
BE-7	NOT ESTAB	85.31(1/ 1) 85.31- 85.31	H WALKER FARM 1.25 MILES NW	85.31(1/ 1) 85.31- 85.31	146.42(1/ 1) 146.42- 146.42	
AC-228	NOT ESTAB	5.33(1/ 1) 5.33- 5.33	H WALKER FARM 1.25 MILES NW	5.33(1/ 1) 5.33- 5.33	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 23

RADIOACTIVITY IN POULTRY

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] LLD	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	3991.96(1/ 1) 3991.96- 3991.96	H WALKER FARM 1.25 MILES NW	3991.96(1/ 1) 3991.96- 3991.96	4727.38(1/ 1) 4727.38- 4727.38	
GAMMA (GELI)[2]						
K-40	NOT ESTAB	1889.26(1/ 1) 1889.26- 1889.26	H WALKER FARM 1.25 MILES NW	1889.26(1/ 1) 1889.26- 1889.26	1934.35(1/ 1) 1934.35- 1934.35	
BI-214	NOT ESTAB	8.04(1/ 1) 8.04- 8.04	H WALKER FARM 1.25 MILES NW	8.04(1/ 1) 8.04- 8.04	1 VALUES <LLD	
PB-214	NOT ESTAB	9.21(1/ 1) 9.21- 9.21	H WALKER FARM 1.25 MILES NW	9.21(1/ 1) 9.21- 9.21	1 VALUES <LLD	
TL-208	NOT ESTAB	0.91(1/ 1) 0.91- 0.91	H WALKER FARM 1.25 MILES NW	0.91(1/ 1) 0.91- 0.91	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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Figure 7

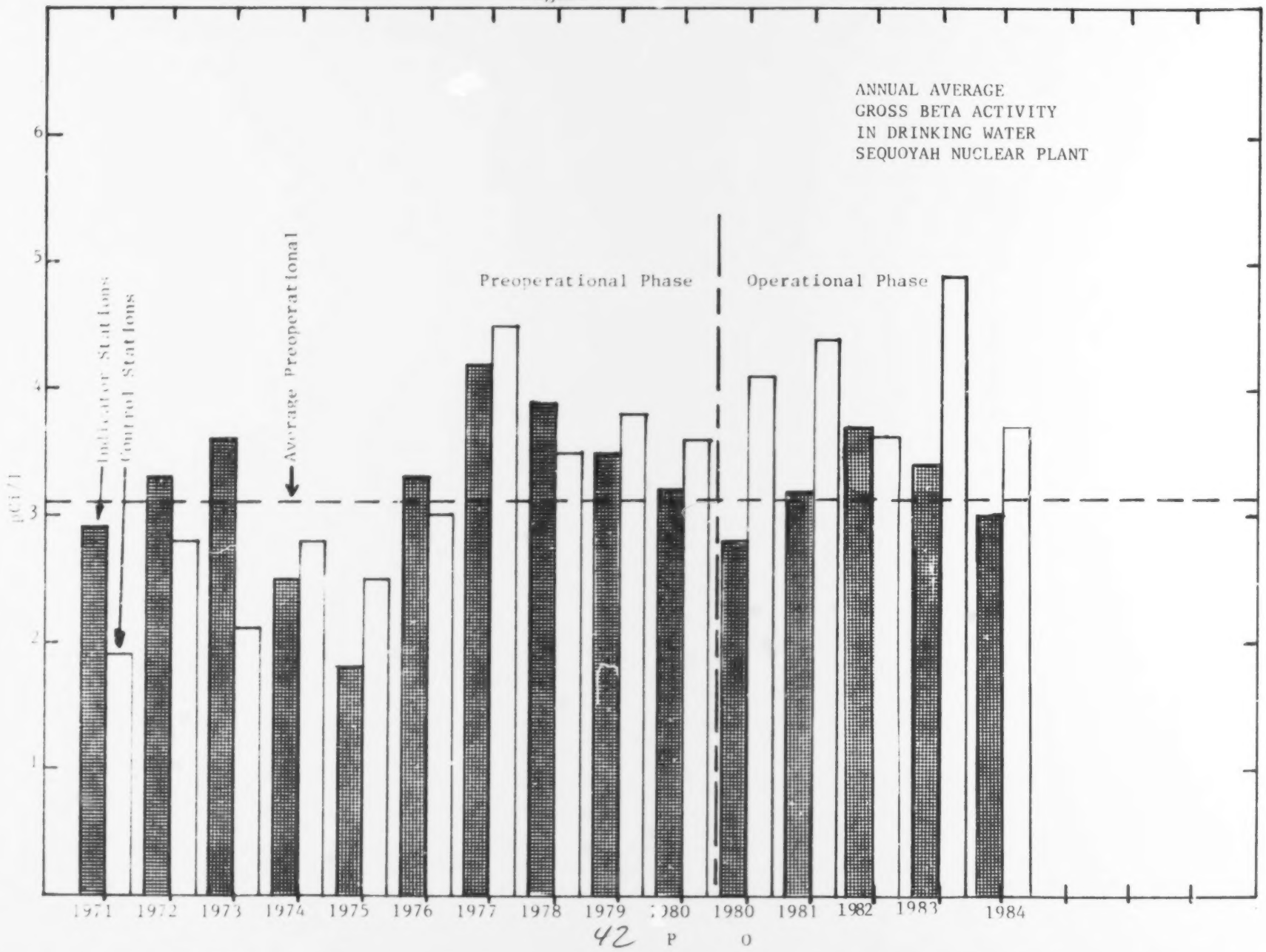

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Figure 8

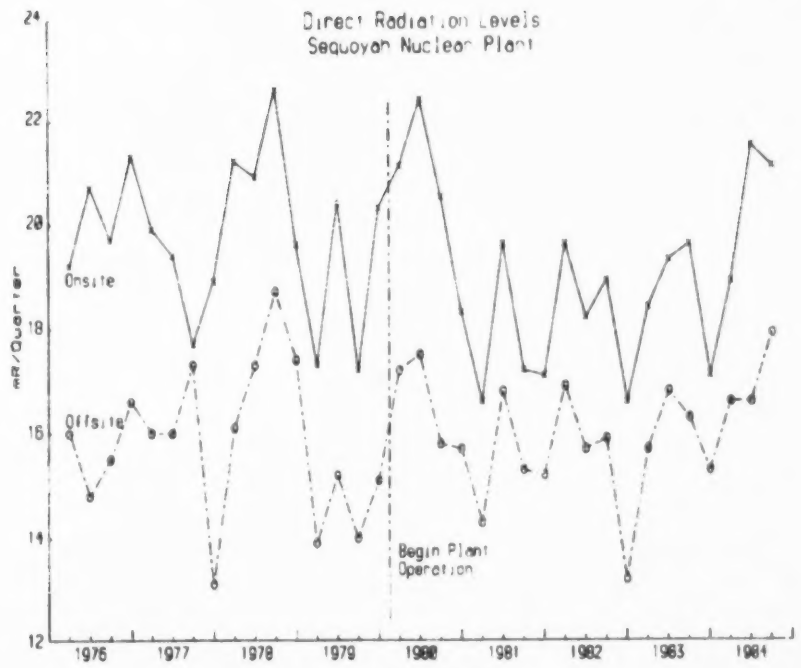

Figure 9

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Reservoir Monitoring

Samples are collected from the Tennessee River as detailed in table 24. Samples collected for radiological analysis include water and Asiatic clams from three of these cross sections, sediment from four cross sections, and fish from three contiguous reservoirs. The locations of these cross sections are shown on the accompanying map (figure 10) and conform to sediment ranges established and surveyed by TVA.

Water

Water samples were collected automatically by sequential type sampling devices at three cross sections and composite samples analyzed monthly for gross alpha and beta activity and gamma-emitting radionuclides. Further composites were made quarterly for strontium and tritium analyses. Results are displayed in table 25. Figure 11 presents a plot of the gross beta activity in surface water from 1971 through 1984. Indicator stations are those located downstream from the plant and controls are located upstream. The levels reported are consistent with gross beta levels measured in surface water samples taken from the Tennessee River in preoperational monitoring programs conducted by TVA at other sites. During this reporting period, one monthly sample was not collected because of equipment problems.

Fish

Radiological monitoring for fish was accomplished by analyses of composite samples of adult fish taken semiannually from each of three contiguous reservoirs--Watts Bar, Chickamauga, and Nickajack. No permanent sampling stations have been established within each reservoir; this reflects the movement of fish species within reservoirs as determined by TVA data from the Browns Ferry Nuclear Plant preoperational monitoring program. Three species, white crappie, channel catfish, and smallmouth buffalo, are collected representing both commercial and game species. Sufficient fish are collected in each reservoir to yield 250 or 300 grams oven-dry weight for analytical purposes. All samples are analyzed for gross alpha and gross beta activity, for gamma-emitting radionuclides, and for strontium content. Results are given in tables 26 through 29.

Sediment

Sediment samples were collected semiannually from dredge hauls made for bottom fauna. Gamma, gross alpha, and gross beta activity and ^{89}Sr and ^{90}Sr content were determined in samples collected from points in four cross sections. Each sample was a composite obtained by combining equal volumes of sediment from each of three dredge hauls at a point in the cross section. Results are given in table 30. One sample was not taken because of flood conditions.

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In addition to the sampling described above, shoreline sediment samples were collected at three recreation-use areas (two downstream from the plant and one upstream) in the vicinity of SQN. Samples were taken in May and November and analyzed for gross alpha, gross beta, gamma-emitting radionuclides, ^{89}Sr, and ^{90}Sr. Results are given in table 31.

Asiatic Clams

Samples of Asiatic clams were collected semiannually with a Ponar dredge from three stations and analyzed for gross alpha, gross beta, and gamma-emitting radionuclides. In addition, the ^{89}Sr and ^{90}Sr content was determined in the shells. Results are given in tables 32 and 33.

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Table 24

SAMPLING SCHEDULE - RESERVIOR MONITORING

Tennessee River (Mile)	Biological Samples				Water Samples
	Benthic Fauna	Sediment	Shoreline Sediment	Fish[a]	
472.8		X			
473.2					Automatic Sampler[b]
477.5			X		
478.3			X		
480.8	X	X			
483.4	X	X			Automatic Sampler[b]
485.2 (Control)			X		
496.5 (Control)	X	X			
497.0 (Control)					Automatic Sampler[b]

[a]Fish samples are taken from Watts Bar, Chickamauga, and Nickajack Reservoirs.

[b]Composite sample analyzed monthly.

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TABLE 25

RADIOACTIVITY IN SURFACE WATER TOTAL

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	2.000	26 VALUES <LLD			12 VALUES <LLD	
38		ANALYSIS PERFORMED				
GROSS BETA	2.300	2.98(20/ 26)	TRM 483.4	3.05(9/ 13)	3.14(9/ 12)	
38		2.34- 4.55		2.34- 4.55	2.59- 3.64	
GAMMA (GELI)						
38						
K-40	NOT REPTAB	10.39(1/ 26)	TRM 483.4	10.39(1/ 13)	12 VALUES <LLD	
		10.39- 10.39		10.39- 10.39		
BI-214	NOT REPTAB	5.28(14/ 26)	TRM 473.2	10.55(5/ 13)	2.7(6/ 12)	
		0.61- 35.56		1.55- 35.56	0.44- 5.50	
PB-214	NOT REPTAB	5.31(8/ 26)	TRM 473.2	8.68(4/ 13)	12 VALUES <LLD	
		0.43- 27.76		0.43- 27.36		
PB-212	NOT REPTAB	1.83(10/ 26)	TRM 483.4	1.85(5/ 13)	1.1(3/ 12)	
		0.34- 3.78		0.55- 3.21	0.77- 1.28	
SR-89	10.000	8 VALUES <LLD			4 VALUES <LLD	
12		ANALYSIS PERFORMED				
SR-90	2.000	8 VALUES <LLD			2.2(1/ 4)	
12					2.22- 2.22	
TRITIUM	330.000	368.12(8/ 8)	TRM 473.2	364.33(2/ 4)	360.1(1/ 4)	
12		336.14- 392.52		336.14- 392.52	360.15- 360.15	

a. Nominal Lower Limit of Detection (LLD) as described in table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 26

RADIOACTIVITY IN WHITE CRAPPIE (FLESH)

PCI/G - C.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.16 (3/ 4)	CHICKAMAUGA RES	0.17 (1/ 2)		0.22 (1/ 2)	
[c]		0.11- 0.21	TRM 471-53C	0.17-	0.17	0.22- 0.22	
GROSS BETA	0.100	30.23 (4/ 4)	NICKAJACK RES	32.25 (2/ 2)		26.92 (2/ 2)	
[c]		18.89- 40.62	TRM 425-471	23.88-	40.62	15.86- 37.97	
GAMMA (GELI)							
[c]							
CS-137	0.020	0.07 (4/ 4)	NICKAJACK RES	0.07 (2/ 2)		0.12 (2/ 2)	
		0.04- 0.08	TRM 425-471	0.07-	0.08	0.10- 0.13	
K-40	NOT ESTAB	15.48 (4/ 4)	NICKAJACK RES	16.59 (2/ 2)		13.08 (2/ 2)	
		11.88- 17.60	TRM 425-471	15.58-	17.60	9.87- 16.29	
BI-214	0.020	0.31 (2/ 4)	CHICKAMAUGA RES	0.34 (1/ 2)		0.24 (1/ 2)	
		0.28- 0.34	TRM 471-53C	0.34-	0.34	0.24- 0.24	
PB-214	NOT ESTAB	0.24 (2/ 4)	CHICKAMAUGA RES	0.33 (1/ 2)		0.21 (1/ 2)	
		0.14- 0.33	TRM 471-53C	0.33-	0.33	0.21- 0.21	
SR 89	0.500	4 VALUES <LLD				2 VALUES <LLD	
[c]		ANALYSIS PERFORMED					
SR 90	0.100	0.13 (1/ 4)	NICKAJACK RES	0.13 (1/ 2)		2 VALUES <LLD	
[c]		0.13- 0.13	TRM 425-471	0.13-	0.13		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 27

RADIOACTIVITY IN CHANNEL CATFISH (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON — TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME, DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.16(2/ 4)	NICKAJACK RES	0.21(1/ 2)		0.16(1/ 2)	
a		0.14- 0.21	TRM 425-471	0.21- 0.21		0.16- 0.16	
GROSS BETA	0.100	21.99(4/ 4)	NICKAJACK RES	25.70(2/ 2)		21.11(2/ 2)	
b		13.24- 34.67	TRM 425-471	16.73- 34.67		11.63- 30.58	
GAMMA (GELI)							
b							
CS-137	0.060	0.06(4/ 4)	CHICKAMAUGA RES	0.06(2/ 2)		0.04(2/ 2)	
		0.05- 0.08	TRM 471-530	0.05- 0.08		0.04- 0.04	
K-40	NOT ESTAB	13.71(4/ 4)	NICKAJACK RES	15.43(2/ 2)		10.52(2/ 2)	
		11.76- 17.91	TRM 425-471	12.95- 17.91		7.75- 13.28	
BI-214	0.060	0.06(3/ 4)	CHICKAMAUGA RES	0.08(1/ 2)		0.03(2/ 2)	
		0.03- 0.08	TRM 471-530	0.08- 0.08		0.02- 0.04	
PB-214	NOT ESTAB	0.04(3/ 4)	CHICKAMAUGA RES	0.05(1/ 2)		0.04(2/ 2)	
		0.04- 0.05	TRM 471-530	0.05- 0.05		0.02- 0.06	
TL-208	NOT ESTAB	0.00(1/ 4)	NICKAJACK RES	0.00(1/ 2)		2 VALUES <LLD	
		0.00- 0.01	TRM 425-471	0.00- 0.00			
AC-228	NOT ESTAB	4 VALUES <LLD				0.01(1/ 2)	
						0.01- 0.01	
SR-89	0.500	4 VALUES <LLD				2 VALUES <LLD	
b		ANALYSIS PERFORMED					
SR-90	0.100	4 VALUES <LLD				2 VALUES <LLD	
b		ANALYSIS PERFORMED					

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 28

RADIOACTIVITY IN SMALLMOUTH BUFFALO (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON — TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME, DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.20(2/ 4) 0.19- 0.22	CHICKAMAUGA RES TRM 471-53C	0.22(1/ 2) 0.22- 0.22	0.17(1/ 2) 0.17- 0.17	
GROSS BETA	0.100	19.50(4/ 4) 13.06- 23.67	NICKAJACK RES TRM 425-471	20.65(2/ 2) 20.46- 20.81	28.01(2/ 2) 25.75- 30.26	
GAMMA (GELI)[b]						
CS-137	0.020	0.06(4/ 4) 0.04- 0.07	CHICKAMAUGA RES TRM 471-53C	0.06(2/ 2) 0.06- 0.07	0.18(2/ 2) 0.05- 0.30	
K-40	NOT ESTAB	12.22(4/ 4) 9.21- 17.32	NICKAJACK RES TRM 425-471	13.26(2/ 2) 9.21- 17.32	12.67(2/ 2) 12.20- 13.15	
BI-214	0.020	0.07(3/ 4) 0.03- 0.09	NICKAJACK RES TRM 425-471	0.09(1/ 2) 0.09- 0.09	0.06(1/ 2) 0.06- 0.06	
PB-214	NOT ESTAB	0.06(3/ 4) 0.04- 0.09	CHICKAMAUGA RES TRM 471-53C	0.07(2/ 2) 0.04- 0.09	0.05(1/ 2) 0.05- 0.05	
PB-212	NOT ESTAB	0.00(1/ 4) 0.00- 0.00	CHICKAMAUGA RES TRM 471-53C	0.00(1/ 2) 0.00- 0.00	0.01(2/ 2) 0.00- 0.01	
SR 89	0.500	4 VALUES <LLD			2 VALUES <LLD	
SR 90[c]	0.100	ANALYSIS PERFORMED 4 VALUES <LLD			2 VALUES <LLD	
		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 29

RADIOACTIVITY IN SMALLMOUTH BUFFALO (WHOLE)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.17(1/ 4)	NICKAJACK RES	0.17(1/ 2)	2 VALUES <LLD	
		0.17- 0.17	TRM 425-471	0.17- 0.17		
GROSS BETA	0.100	16.83(4/ 4)	CHICKAMAUGA RES	17.14(2/ 2)	17.45(2/ 2)	
		12.83- 20.19	TRM 471-530	16.63- 17.65	17.25- 17.66	
GAMMA (GELI)						
CS-137	0.030	0.05(1/ 4)	CHICKAMAUGA RES	0.05(1/ 2)	0.05(2/ 2)	
		0.05- 0.05	TRM 471-530	0.05- 0.05	0.03- 0.06	
K-40	NOT ESTAB	7.57(4/ 4)	CHICKAMAUGA RES	7.84(2/ 2)	8.05(2/ 2)	
		6.44- 8.15	TRM 471-530	7.72- 7.96	7.95- 8.15	
BI-214	0.030	0.04(3/ 4)	CHICKAMAUGA RES	0.05(1/ 2)	0.04(1/ 2)	
		0.03- 0.05	TRM 471-530	0.05- 0.05	0.04- 0.04	
PB-214	NOT ESTAB	0.06(3/ 4)	CHICKAMAUGA RES	0.06(1/ 2)	0.03(2/ 2)	
		0.03- 0.08	TRM 471-530	0.06- 0.06	0.02- 0.03	
RA-226	NOT ESTAB	0.00(2/ 4)	NICKAJACK RES	0.00(1/ 2)	0.01(1/ 2)	
		0.00- 0.00	TRM 425-471	0.00- 0.00	0.01- 0.01	
SR-89	0.500	0.67(2/ 4)	NICKAJACK RES	0.73(1/ 2)	2 VALUES <LLD	
		0.61- 0.73	TRM 425-471	0.73- 0.73		
SR-90	0.100	0.15(1/ 4)	NICKAJACK RES	0.18(1/ 2)	0.16(1/ 2)	
		0.15- 0.16	TRM 425-471	0.16- 0.18	0.16- 0.16	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 30

RADIOACTIVITY IN SEDIMENT

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1984

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a]	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA 7	0.350	2.22(6/ 6) 1.12- 3.50	TRM 48C.82	2.65(2/ 2) 1.79- 3.50	3.42(1/ 1) 3.42- 3.42	
GROSS BETA 7	0.700	37.98(6/ 6) 32.53- 42.76	TRM 46C.82	40.45(2/ 2) 39.13- 42.75	40.95(1/ 1) 40.95- 40.95	
GAMMA (GELI) 7						
CO-60	0.010	0.29(4/ 6) 0.17- 0.41	TRM 48C.82	0.37(2/ 2) 0.33- 0.41	1 VALUES <LLD	
CS-137	0.020	1.51(6/ 6) 0.10- 2.63	TRM 472.8C	2.23(2/ 2) 1.83- 2.63	1.45(1/ 1) 1.45- 1.45	
K-40	NOT ESTAB	14.83(6/ 6) 13.28- 16.62	TRM 483.4	15.59(2/ 2) 14.56- 16.62	14.73(1/ 1) 14.73- 14.73	
BI-214	0.020	1.60(6/ 6) 1.14- 2.39	TRM 48C.82	1.80(2/ 2) 1.21- 2.39	1.89(1/ 1) 1.89- 1.89	
BI-212	0.100	1.66(3/ 6) 1.56- 1.89	TRM 48C.82	1.74(2/ 2) 1.59- 1.89	1 VALUES <LLD	
PB-214	NOT ESTAB	1.75(6/ 6) 1.21- 2.67	TRM 48C.82	2.00(2/ 2) 1.34- 2.67	1.75(1/ 1) 1.75- 1.75	
PB-212	NOT ESTAB	1.46(6/ 6) 1.21- 1.94	TRM 48C.82	1.65(2/ 2) 1.36- 1.94	1.55(1/ 1) 1.55- 1.55	
RA-226	NOT ESTAB	1.17(2/ 6) 1.14- 1.21	TRM 48C.82	1.21(1/ 2) 1.21- 1.21	1 VALUES <LLD	
RA-224	NOT ESTAB	1.66(1/ 6) 1.66- 1.66	TRM 48C.82	1.66(1/ 2) 1.66- 1.66	1 VALUES <LLD	
TL-208	0.020	0.49(6/ 6) 0.39- 0.60	TRM 48C.82	0.53(2/ 2) 0.46- 0.60	0.39(1/ 1) 0.39- 0.39	
AC-228	0.060	1.41(6/ 6) 1.24- 1.51	TRM 463.4	1.50(2/ 2) 1.48- 1.51	1.49(1/ 1) 1.49- 1.49	
SR 89 7	1.500	6 VALUES <LLD ANALYSIS PERFORMED			1 VALUES <LLD	
SR 90 7	0.300	6 VALUES <LLD ANALYSIS PERFORMED			1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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TABLE 31

RADIOACTIVITY IN SHORE LINE SEDIMENT

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1994

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	NOT ESTAB	2.61(4/ 4)	GOLD POINT	3.48(2/ 2)	2.96(2/ 2)	
6		1.25- 3.55	TRM 478	3.41- 3.55	2.83- 3.10	
GROSS BETA	0.700	14.34(4/ 4)	GOLD POINT	16.03(2/ 2)	22.85(2/ 2)	
6		6.30- 25.75	TRM 478	6.30- 25.75	21.64- 24.06	
GAMMA (GELI)						
6						
CO-60	0.010	0.04(1/ 4)	GOLD POINT	0.04(1/ 2)	2 VALUES <LLD	
		0.04- 0.04	TRM 478	0.04- 0.04		
CS-137	0.020	0.07(3/ 4)	GOLD POINT	0.07(1/ 2)	0.15(2/ 2)	
		0.03- 0.10	TRM 478	0.07- 0.07	0.02- 0.29	
K-40	NOT ESTAB	4.83(4/ 4)	GOLD POINT	6.20(2/ 2)	6.97(2/ 2)	
		2.29- 7.53	TRM 478	4.87- 7.53	6.69- 7.25	
BI-214	0.020	0.89(4/ 4)	GOLD POINT	1.01(2/ 2)	0.98(2/ 2)	
		0.65- 1.07	TRM 478	0.95- 1.07	0.86- 1.10	
BI-212	0.100	1.06(4/ 4)	GOLD POINT	1.46(2/ 2)	1.34(2/ 2)	
		0.55- 1.54	TRM 478	1.39- 1.54	1.24- 1.43	
PB-214	NOT ESTAB	0.97(4/ 4)	GOLD POINT	1.08(2/ 2)	1.08(2/ 2)	
		0.73- 1.17	TRM 478	1.00- 1.17	0.97- 1.19	
PB-212	0.020	0.93(4/ 4)	GOLD POINT	1.30(2/ 2)	1.20(2/ 2)	
		0.45- 1.33	TRM 478	1.28- 1.33	1.08- 1.32	
RA-226	NOT ESTAB	0.89(4/ 4)	GOLD POINT	1.01(2/ 2)	0.98(2/ 2)	
		0.65- 1.07	TRM 478	0.95- 1.07	0.86- 1.10	
RA-223	NOT ESTAB	4 VALUES <LLD			0.39(1/ 2)	
					0.39- 0.39	
RA-224	NOT ESTAB	1.09(3/ 4)	GOLD POINT	1.38(2/ 2)	1.31(2/ 2)	
		0.51- 1.52	TRM 478	1.24- 1.52	1.13- 1.48	
BE-7	0.020	0.18(1/ 4)	HARRISON FLATS	0.18(1/ 2)	2 VALUES <LLD	
		0.18- 0.18	TRM 477	0.18- 0.18		
TH-208	0.020	0.32(4/ 4)	GOLD POINT	0.44(2/ 2)	0.40(2/ 2)	
		0.16- 0.47	TRM 478	0.42- 0.47	0.36- 0.44	
AC-228	0.060	0.95(4/ 4)	GOLD POINT	1.30(2/ 2)	1.23(2/ 2)	
		0.47- 1.34	TRM 478	1.25- 1.34	1.13- 1.33	
PA-234M	NOT ESTAB	2.65(2/ 4)	HARRISON FLATS	2.90(1/ 2)	2.08(1/ 2)	
		2.41- 2.90	TRM 477	2.90- 2.90	2.08- 2.08	
SR 89	1.500	4 VALUES <LLD			2 VALUES <LLD	
6		ANALYSIS PERFORMED				
SR 90	0.300	4 VALUES <LLD			2 VALUES <LLD	
6		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 32

RADIOACTIVITY IN CLAM FLESH

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY [illegible] DOCKET NO. [illegible]
LOCATION OF FACILITY [illegible] REPORTING PERIOD [illegible]

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a]	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b]	RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.47(4/ 4)	TRM 48C.82	0.70(2/ 2)		0.24(2/ 2)		
6		0.15- 1.15		0.26- 1.15		0.10- 0.42		
GROSS BETA	0.100	8.70(4/ 4)	TRM 48C.82	12.02(2/ 2)		0.15(2/ 2)		
6		3.34- 15.69		8.36- 15.69		2.26- 5.15		
GAMMA (GELI)								
6								
CO-60	0.050	0.21(1/ 4)	TRM 48C.82	0.21(1/ 2)		2 VALUES <LLD		
		0.21- 0.21		0.21- 0.21				
CS-137	0.050	0.30(1/ 4)	TRM 48C.82	0.30(1/ 2)		2 VALUES <LLD		
		0.30- 0.30		0.30- 0.30				
K-40	NOT ESTAB	5.40(2/ 4)	TRM 48C.82	5.07(1/ 2)		5.72(1/ 2)		
		1.73- 9.07		5.07- 5.07		5.39- 6.06		
BI-214	NOT ESTAB	1.69(3/ 4)	TRM 48C.82	2.56(1/ 2)		0.55(2/ 2)		
		0.50- 2.56		2.56- 2.56		0.65- 0.65		
PB-214	NOT ESTAB	1.33(4/ 4)	TRM 48C.82	1.47(2/ 2)		0.52(2/ 2)		
		0.18- 2.64		0.31- 2.64		0.37- 1.44		
PB-212	NOT ESTAB	0.25(2/ 4)	TRM 48C.82	0.25(2/ 2)		0.13(1/ 2)		
		0.11- 0.39		0.11- 0.39		0.13- 0.13		
TL-208	NOT ESTAB	0.16(1/ 4)	TRM 48C.82	0.16(1/ 2)		0.24(1/ 2)		
		0.16- 0.16		0.16- 0.16		0.24- 0.24		
AC-228	NOT ESTAB	0.23(1/ 4)	TRM 483.4	0.23(1/ 2)		2 VALUES <LLD		
		0.23- 0.23		0.23- 0.23				

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a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

TABLE 33

RADIOACTIVITY IN CLAM SHELL

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON, TENNESSEE — REPORTING PERIOD 1986

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.700	4 VALUES <LLD			0.91(2/ 2)	
6					0.76- 0.95	
GROSS BETA	0.700	3.93(4/ 4)	TRM 480.82	4.31(2/ 2)	5.44(2/ 2)	
6		3.51- 4.79		3.84- 4.79	5.26- 5.66	
GAMMA (GELI)						
6						
CO-60	0.010	0.02(2/ 4)	TRM 480.82	0.02(2/ 2)	0.02(2/ 2)	
		0.02- 0.02		0.02- 0.02	0.01- 0.02	
CS-137	0.020	0.02(1/ 4)	TRM 480.82	0.02(1/ 2)	0.02(1/ 2)	
		0.02- 0.02		0.02- 0.02	0.02- 0.02	
K-40	NOT ESTAB	0.17(3/ 4)	TRM 480.82	0.20(2/ 2)	0.24(2/ 2)	
		0.10- 0.22		0.19- 0.22	0.22- 0.25	
MN-54	0.010	0.02(2/ 4)	TRM 480.82	0.02(2/ 2)	2 VALUES <LLD	
		0.01- 0.02		0.01- 0.02		
BI-214	0.050	0.12(4/ 4)	TRM 480.82	0.17(2/ 2)	0.22(2/ 2)	
		0.06- 0.21		0.13- 0.21	0.18- 0.27	
BI-212	0.100	0.18(1/ 4)	TRM 480.82	0.18(1/ 2)	0.23(2/ 2)	
		0.18- 0.18		0.18- 0.18	0.22- 0.25	
PB-214	0.050	0.13(4/ 4)	TRM 480.82	0.19(2/ 2)	0.26(2/ 2)	
		0.05- 0.21		0.16- 0.21	0.19- 0.32	
PB-212	NOT ESTAB	0.07(4/ 4)	TRM 480.82	0.11(2/ 2)	0.16(2/ 2)	
		0.01- 0.11		0.11- 0.11	0.16- 0.16	
RA-226	0.050	0.12(4/ 4)	TRM 480.82	0.17(2/ 2)	0.22(2/ 2)	
		0.06- 0.21		0.13- 0.21	0.18- 0.27	
TL-208	0.020	0.04(2/ 4)	TRM 480.82	0.04(2/ 2)	0.06(2/ 2)	
		0.04- 0.04		0.04- 0.04	0.05- 0.07	
AC-228	0.060	0.21(4/ 4)	TRM 480.82	0.21(2/ 2)	0.32(2/ 2)	
		0.20- 0.22		0.20- 0.22	0.27- 0.37	
SR-89	5.000	5.89(1/ 4)	TRM 483.4	5.89(1/ 2)	15.34(1/ 2)	
6		5.89- 5.89		5.89- 5.89	15.34- 15.34	
SR-90	1.000	1.36(4/ 4)	TRM 480.82	1.64(2/ 2)	1.20(2/ 2)	
6		1.08- 1.81		1.47- 1.81	1.14- 1.25	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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Figure 10

RESERVOIR MONITORING NETWORK
SEQUOYAH NUCLEAR PLANT

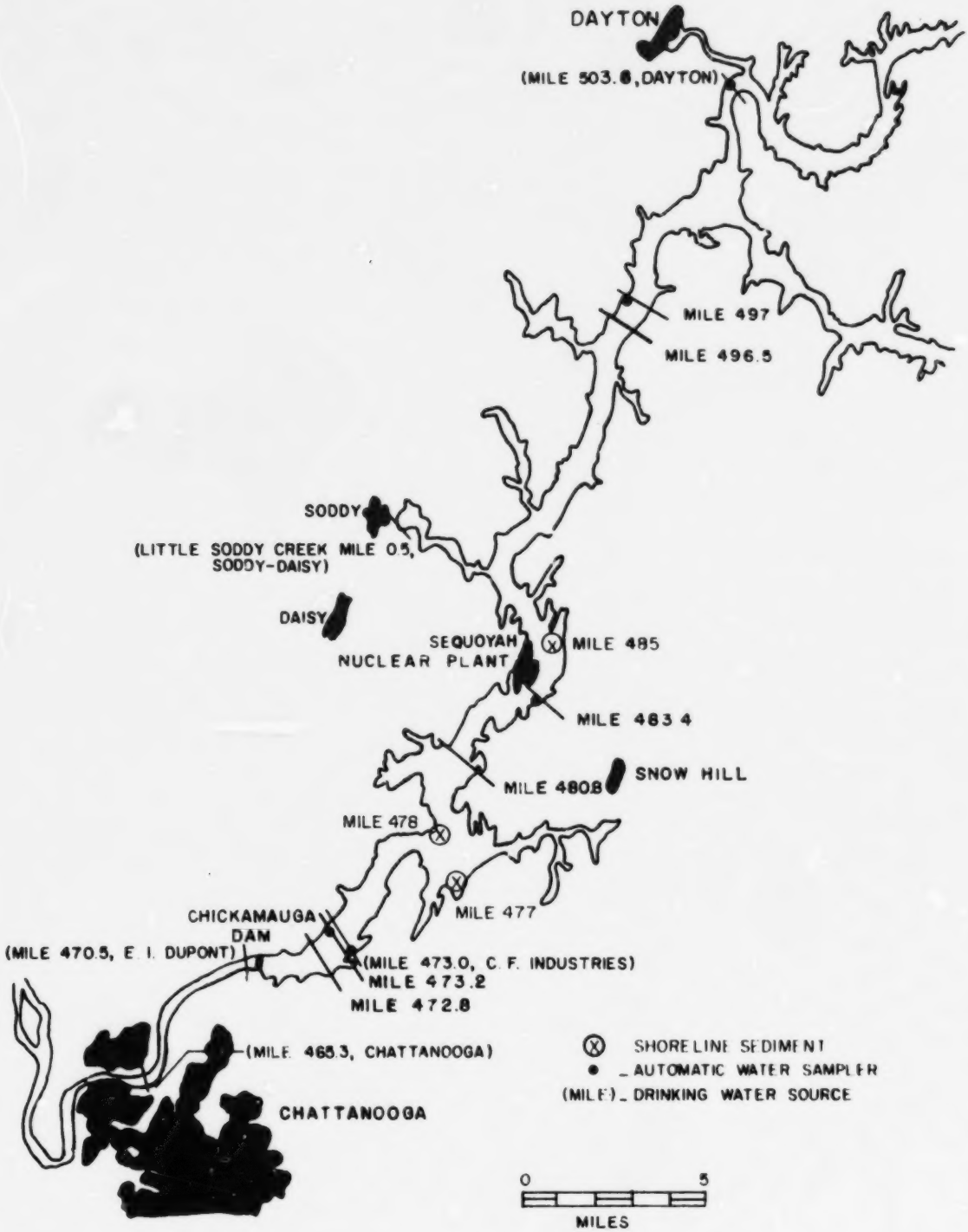

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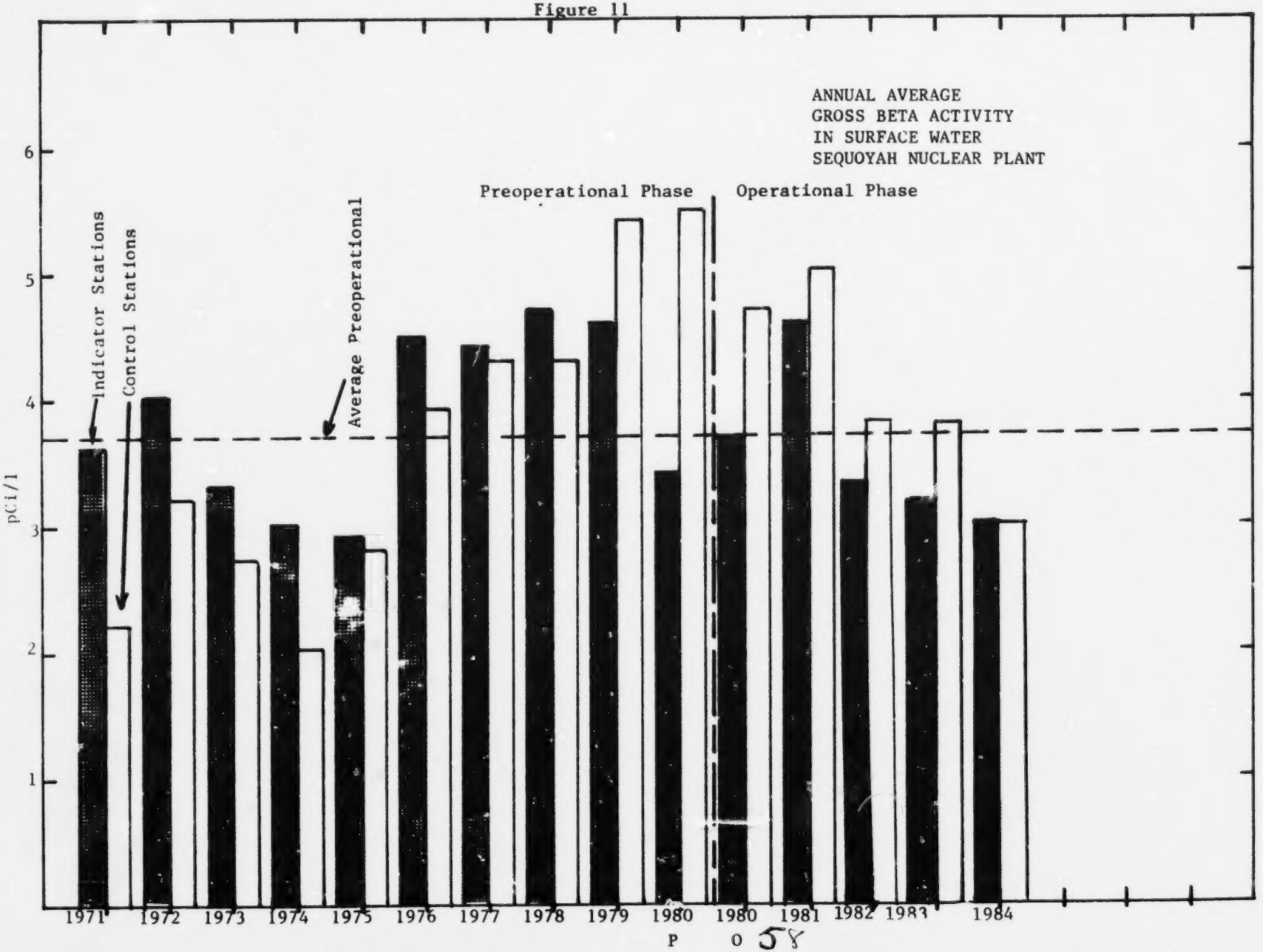
Figure 11



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Quality Control

A quality control program has been established with the Tennessee Department of Public Health Radiological Laboratory and the Eastern Environmental Radiation Facility, Environmental Protection Agency, Montgomery, Alabama. Samples of air, water, milk, fish, and soil collected around nuclear plants are forwarded to these laboratories for analysis, and results are exchanged for comparison.

Data Analysis

Data measured at the control stations for each medium were averaged for each sampling period. In order to describe the distribution of control station data, a mean, standard deviation, and 3-sigma limits were calculated. We can expect that background concentrations would be distributed within these limits. This provides the basis for comparing control and indicator data. If the indicator data fall within the 3-sigma limits defined for control data, we conclude that the indicator data were not significantly affected by the nuclear plant. If the data do not fall within the limits, we will perform further analyses to determine if the difference is attributable to the nuclear plant.

Conclusions

A vast majority of the indicator station data was found to be within the distribution defined by the control station data. The data analysis software identified concentrations slightly exceeding the limits of the control station data for a small number of radionuclides in samples for indicator stations. Many of these values may be discounted because the error reported by the analysis program was greater than the calculated concentration. The remaining isolated, elevated concentrations may be the result of fallout, fluctuations in the existing environment, computer program artifacts, or analytical errors. The same type of isolated high values occurred in the control station data and may be attributed to the same sources.

Dose estimates were made from concentrations of radioactivity found in samples of environmental media such as air, milk, drinking water, and fish. Doses estimated for persons at the indicator locations were essentially identical to those determined for persons at control locations. Greater than 95 percent of those doses were contributed by the naturally occurring radionuclide potassium-40, and by strontium-90 and cesium-137 which are long-lived radioisotopes found in fallout from nuclear weapons testing conducted over the last several years.

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From the above analysis of the data and from the trend plots presented earlier, it is concluded that there were no significant increases in the exposure to members of the general public attributable to the operation of SQN. Indications of the presence of small quantities of fission products have been seen in sampled media such as vegetation, Asiatic clams, and sediment. The levels measured were extremely low, for example near the nominal lower limits of detection, and were well below the reporting levels required by the NRC. No increases of radioactivity have been seen in water samples. These media will be monitored closely for indications of increases.

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